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Computer Networking: Spinsters on the Web

by Ellen Balka

January 1997

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Acknowledgements

Several years ago when I was a graduate student at Simon Fraser University, the late Maggie Benston, Elaine Bernard and I stumbled through learning about computer networks together. As we made our way through a maze of technical information we clung to the idea that this technology could somehow support the work of social change groups. We were aware though of the complexity of the technology, its seductiveness, and the need to present computer networking to social change audiences in ways that were both relevant and critical. It is my hope that I have done that here.

Some of the material that appears here was developed during my doctoral studies at Simon Fraser University, which provided me with the financial and computing resources as well as intellectual free rein to investigate the use of computer networks in the context of feminist social change. During that time I was fortunate to work with Maggie Benston, Liora Salter, Arleen McLaren and Bob Anderson. John Bradley and Mark Drew provided me with all sorts of technical support, Jerry Barenholtz and Ellen Karpinski with shelter, and my friends in Vancouver, especially Jesse Gossen, Jill Stainsby, Francis Wasserlien, Jacqui Parker-Snedker and Pat Mirenda with support.

After I moved to Newfoundland, Martha Muzychka encouraged me to complete this project, despite competing demands. Terrance Murphy, Dean of Arts at Memorial University made sure that I had time to write. In recent years contact with Leslie Regan-Shade, Heather Menzies and Fiona MacGregor has reminded me of the need for such a resource. Fiona MacGregor also provided invaluable comments on drafts of the manuscript, along with Martha Muzychka and Jennifer Mercer. Wendy Williams, Leslie Bella and Bev Brown have provided support and encouragement along the way. I have Leslie Bella to thank for "Spinsters on the Web."

Over the years I have been privileged to work with several women's organizations interested in computer networking. This process began in 1986 when Corky Bush had me do a hands-on computer networking workshop for the Idaho chapter of the American Association of University Women. Much of the pragmatic material contained here and the insights about using computers in feminist organizations resulted from ongoing connections with women's groups. In particular, I owe thanks to the CRIAW staff, who over the years, have spent a good deal of time talking to me about the trials and tribulations of computer networking.

This book was written with Maggie Benston's memory ever present in my mind, and is dedicated to women communicating about how to make the world a better place.

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CHAPTER 1

INTRODUCTION

INTRODUCTION

With recent media hype about the information highway (the Internet), it is not surprising that several women have suggested that computer networking can be used to improve the quality of women's lives. For example, Becky Mulvaney (1994) suggests that computer networking holds the promise of a more participatory democracy. Penney Kome (1995) suggests that the Internet can be used to protect and accelerate the feminist agenda. Carla Sinclair (1996) suggest that women will experience a sense of empowerment by gaining access to the Internet and knowledge about it. Kristen Spence (1996) says that the big deal about the Internet is that "it's all about communication, power, equality (xi)" and that every woman owes it to herself to 'get wired' (start using the Internet). Jennifer Light (1995) argues that computer networking that emphasizes "women's issues can recast traditional notions of the computer and its relationship with women" (133).

As the use of personal computers has increased and computer networks have become more widespread, so too have claims about the potential of computer networking technology to liberate the masses. Computer networks were viewed early in their evolution by those who used them (mostly men with technical backgrounds) as convivial and participatory, and antithetical to the dominant uses of electronic communications media that were centrally controlled (Rossman, 1979). Described as a "communications medium that can be shared by all" (Knight, 1983, p. 123), some viewed computer networks as a challenge to conventional hierarchies of control (Rossman, 1979).

McCullough (1991) points out that as the cost of personal computers have declined, resource-poor community groups engaged in organizing for social change have become the unexpected beneficiaries of computer technology. Computer networks, viewed as having the potential to "make a horizontal cut through the standard vertical organizational chart" (Brilliant, 1985, p. 174) are particularly appealing to social change organizations, which are frequently structured and managed non-hierarchically.

At the same time that they acknowledge that computer technology is embedded in political, economic and cultural structures of domination, Downing, Fasano, Friedland, McCullough, Mizrahi and Shapiro (1991) argue that computers "can now be appropriated into organizing for progressive social change" (p. 8). These assertions are supported by popular views of technology (Balka, 1987; Bush, 1983) which suggest that technology is neutral and value free, and that how it is used determines if it is good or bad.

Popular debates about computer networking technology suggest that it ought to meet a diverse array of needs, including those of women's organizations dedicated to feminist social change. In theory, computer networks ought to be consistent with the democratic, decentralized, participatory structures of

women's organizations dedicated to feminist social change. Theory suggests that computer networks should be accessible to a wide range of women, and that they can enhance the flow of information between members of women's organizations, as well as between organizations.

Even though the use of computer networks has become increasingly popular in the last decade and research concerned with both women and technological change and the social implications of computer networking has proliferated, neither the use of computer networks by women, nor the use of computer networks in the context of feminism have often been subjects of study. The material presented here is based upon research (Balka, 1991) that addressed these omissions through an examination of the use of computer networks by women and men who have consciously pursued the use of this technology to communicate about women's issues and feminism.

THEORETICAL BACKGROUND

Kramarae (1988) points out that women's speech and technology are richly interconnected, and that technological processes have lasting impacts on women's communications. She argues that all technological developments can usefully be studied with a focus on women's interaction, and points out that all technological practices (including the processes of innovation, creation, production, maintenance and use of technology) affect the ways, places and content of talk, writing and publishing in a feminist context. For Kramarae, social relations can be considered to be organized and structured by technological systems. Among the questions she poses are: what cultural assumptions about these technologies are present in women's interaction? How do our descriptions and understanding of talk differ once we consider technological practices? What are the technological fixes or solutions that women apply and that others apply to women's lives? In a broad sense, the material presented here attempts to address Kramarae's questions in relation to the use of computer networks for communication about women's issues and feminism.

Investigation of this topic is, by nature, multi-disciplinary. In studying women's use of computer networks in the context of feminist social change, several areas of theory that are seldom considered together are relevant. For example, theory concerned with technology as a social phenomenon is seldom considered in the context of feminist social change. Both bodies of theory are essential to developing an understanding of how feminists and social change activists have come to consider computer networks in their social change work, as well as in explaining the processes that occur as computer networking technology is adapted to meet these ends.

In analyzing the use of computer networks for feminist communication many areas of theory are relevant. Early theory about the interaction of technology and society (for example, Ellul, 1967 and Mesthene, 1970) introduced general concepts that were widely adopted in debates about the interaction of technology and society. Although these works played a significant role in the development of more recent theories about technology and social change, they were not grounded in lived experience. As scholars began conducting case studies of technological change (for example, Braverman, 1974; Noble, 1979 & 1984), alternative theoretical positions began emerging. As women began to identify and assess the impacts of technological change on women (Benston, 1983a & 1983b; Smith, 1983), theory began to appear that suggested that technology plays a role in organizing social interactions in general, and gender relations in particular (Bush, 1983; Gay, 1986). This notion challenges popular views of technology (that technology is

neutral and value free) and locates technology in a social context, and at the same time suggests that social values and social bias are built into the process of machine design.

Franklin (1990) reminds us of the processes that produce social bias of technological systems in her opening to the 1989 Massey Lectures, where she develops the analogy of a house to describe technology:

> Technology has built the house in which we all live. The house is continually being extended and remodeled. More and more of human life takes place within its walls, so that today there is hardly any human activity that does not occur within this house. All are affected by the design of the house, by the division of its space, by the location of its doors and walls (Franklin, 1990, p. 11).

In much the same way that people design houses that play a role in ordering social interactions, Franklin suggests that technology contributes to the organization of social interactions. Although this position is gaining in popularity, there are few examples on which to base this assertion, and even fewer examples that show us how this occurs. The material presented below is based on a larger study (Balka, 1991) that details some of the ways that social bias is present in computer networking systems. Thus, this handbook assumes as a starting point that technological systems reflect social values. This handbook will ideally aid women's groups in understanding both how organizational communication might be affected through the selection of a particular networking system, and how organizational goals may be met or hampered through the implementation of a computer networking system. In addition, the material presented here underscores the importance of technology as a women's issue.

Although there is still little data about how women's groups are using computer networking technology, the material presented below about how individuals have come together via computer networks to discuss women's issues raises important questions about the use of this technology within the alternative structures of women's organizations. Concern with how women communicate in groups has been a popular topic since the emergence of the contemporary women's movement (Bunch, 1974 & 1987; Egan, Gardner & Persad, 1988; Freeman & Macmillian 1976; Freeman, 1973). Although there are surprisingly few written accounts that explore the extent to which theory about interaction in women's groups has been applied in practice, this issue is important both theoretically and socially.

If technology plays a role in organizing social interactions as Kramarae (1988), Franklin (1990) and others suggest, then the adoption of computer networking technology by women's organizations may contribute to the complexity of social interactions in these organizations. Returning to Franklin's analogy, in adapting computer networks women's groups are in a sense remodeling their offices. However, in the absence of any information about the use of computer networks in the context of feminist social change, the processes that constitute remodeling are proceeding despite a lack of understanding of building design and construction. For women's organizations interested in computer networks, the material presented below is comparable to a theory of building design and construction for architects.

In order for women's organizations to benefit from using computer networking technology, additional information about how this technology organizes social interactions may prove invaluable.

OVERVIEW OF HANDBOOK

This handbook was developed for novice computer users, with little or no experience with computer networking who work in feminist organizations. It may also be of interest to people working in non-profit organizations in general, as well as anyone who is interested in thinking through the implications of introducing computer networks into a workplace. Most of the popular writing about computer networks focuses on using computer networks in the home for entertainment, or what can be done with computer networks, rather than how to introduce them into a workplace. This handbook attempts to fill that gap by providing an overview of computer networking in women's organizations.

The handbook attempts to answer questions such as:

- How are women using computer networks in the context of feminism?
- Who are the people engaging in feminist dialogue via computer networks, and what do they discuss?
- Is there a relationship between the structure of computer networks and the types of communication that occur on-line?
- When discussing women's issues and feminism via computer, what does group process look like?
- Can individual women and women's groups use computer networking technology for feminist social change?

These issues are addressed below through three types of material. Introductory material is presented in chapters two, three and four (Part A). Issues that arise when women's groups attempt to use computer networks in the context of social change are addressed in chapters five and six (Part B). Strategies for the successful implementation of computer networks in feminist organizations are presented in chapter seven (Part C).

Part A of the handbook (chapters 1-4) introduces readers to the concepts and terminology of computer networking through social history. In addition this portion of the book also provides an overview of women's early efforts to use computer networks, and outlines some of the difficulties that can arise when women's organizations attempt to 'get on-line.'

Introductory and historical material contained in chapter two is intended to familiarize the reader with both how computer networks work, and the historical circumstances surrounding the early development of computer networks.

In reading about computer networks it is rare to find a conceptual overview of different types of computer networks and the different forms of communication supported by this technology. Perhaps as a consequence, the relationship between the structure of computer networks and the types of communication each network structure supports has been left largely unexplored. Novice network users often fail to grasp the notion that not all forms of computer mediated communications are possible given the use of a particular computer networking system. A conceptual overview of computer networking technology is essential if organizations are to select computer networking systems that will ultimately meet the social goals for which they were intended. This material is presented in chapter two.

Chapter three begins to chronicle the use of computer networks by individuals and women's groups to discuss women's issues and feminism. The material presented in chapter three comes from several sources, including participant observation, communication with

others via computer network, and transcripts of discussions that took palace via computer network over several years. In many cases information about the use of computer networks by women's groups was gained through active involvement with those groups. This usually took the form of informal discussions of organizational plans to use computer networks, and included facilitating hands-on workshops for those groups. In some cases formal interviews were conducted with founders of computer networks A small portion of the material contained in chapter three came from publications.

Chapter three serves two functions. First, it provides an historical perspective of the use of computer networks in the context of feminist social change. Second, through brief discussions of computer networks that have both succeeded and failed, and that were either used or intended to be used in the context of feminist social change issues addressed in greater depth in part B are identified.

Chapter four addresses more recent developments in computer networking. Using the concepts introduced in chapter two, chapter four outlines recent developments such as the World Wide Web, which allows users to search for and retrieve information (including pictures) via a graphical user interface (the norm for Macintosh computers and Microsoft Windows) and a mouse.

Part B (chapters five and six) addresses social issues related to women's use of computer networks. Chapter five focuses on women's access to computer networks. Chapter six focuses on how computer networks can be used in relation to feminism, as well as the challenges of implementing computer networks in feminist organizations.

Chapter five begins with discussion of how the structure of computer networks is related to the types of communication that occur on-line. The chapter continues with a discussion of the accessibility of computer networking systems to women and women's groups, that covers a range of topics including cost of access, bilingualism and access to computer systems, and the mystification of computing and women's relationships to technology and computers. In chapter six, feminist organizations and organizing are discussed. Feminism is examined as a series of three related sets of relationships: those that occur on an individual level and between individuals, those that occur when women work for social change within groups, and the relationship of feminist groups to social institutions. These relationships are addressed through a focus on feminist organizational structures, the functions of feminist organizations, feminist organizations as workplaces and tasks related to feminist organizing.

Part C (chapter seven) is based on a central premise of feminism: that theory and practice should be inextricably linked. Chapter seven introduces readers to the concept of participatory design. Participatory design is an approach to designing technology in general and computer systems in particular, that grew from failures of past computer systems to meet the needs of the people using the systems. The basic premises of participatory design are introduced, and similarities in the basic philosophies of participatory design and feminism are discussed. Chapter seven presents an argument for developing knowledge about computer systems within feminist organizations, rather than relying on outside experts to design and implement computer systems within feminist organizations.

Chapter seven also includes a series of exercises and worksheets designed to take organizations through the process of determining their computer networking needs, and acquiring appropriate equipment to meet

those needs. After a brief introduction, chapter seven takes readers through a series of exercises. Examples show readers how to do the exercises. Blank worksheets for completing the exercises are included at the end of the chapter.

This handbook was written to provide a conceptual overview of computer networking technology, a bit of history of how women's groups have used it, and raise awareness of some of the issues that may arise as feminist organizations attempt to use the technology. Although the handbook outlines a number of exercises geared towards determining your organization's computer networking needs, it is not a "how-to" book in that it does not tell readers how to use specific computer programs. The handbook is intended as a starting point. It will (hopefully) give readers enough of a sense about what is going on with computer networks that they will be able to make some sense out of conversations with network providers, and won't tremble in fear at the sight of one of those "how-to" books that tells you all of the commands to type. Thus, this book is perhaps best read prior to trying to connect with a computer network, and should serve as a handy reference as one's understanding of computer networking technology develops.

Throughout the text, terms appear in bold print the first time they are used. Terms that appear in bold print are included in a glossary, which appears in an appendix.

CHAPTER 2

COMPUTER NETWORKS (I): AN INTRODUCTION

COMPUTER NETWORKING SYSTEMS DEMYSTIFIED

When computer networks work properly, users can pass information quickly and inexpensively between far away places. Depending on how a computer network is structured and used, it can meet communication needs that are often handled by telephone answering machines, the postal system, community bulletin boards, bathroom walls, board rooms, radio talk shows, and living rooms filled with friends.

Computer networks, in a general sense are a combination of **hardware** (the parts of your computer equipment you can see and touch), and **software** (also known as programs; a set of instructions, or recipes that tell your hardware what to do, but are intangible in the sense you cannot touch them), that are physically organized in a particular way. Computer networks can be accessed through a simple personal computer that has a **modem** (a special piece of hardware, that allows computer signals to travel over phone lines) attached to it, a phone jack nearby, and is using a computer communications program, (that can be obtained free).

At least one computer that is a part of a computer network must have a special kind of communications program, that allows it to act as **a host**[1] computer. A host computer coordinates the activities of computer users who call into it. It receives mail and forwards it to the appropriate place, provides a place for a database to be stored, and so on. The host computer can be a five hundred dollar personal computer, a fifty thousand dollar computer at an institution such as a university, or any computer that falls in between.[2]

Since the concept of computer communications networks was introduced, several forms of computer networking have emerged. Most forms of computer communications (e.g., **electronic mail**, **computer bulletin boards**) revolve around the idea of sending messages from one computer to another, or from one user of a computer to another on the same system. These applications use similar hardware and software, and, not surprisingly, overlap exists in the provision of these services.[3]

---

[1]I have used the term host here, as it is commonly used in literature about computer networking. However, in discussing feminist computer networks, hostess, or a non-gendered term may in fact be more appropriate.

[2]More detailed information about hardware and software required for computer networking is available in Appendix #1.

[3]When computer networking first emerged, the range of services available on a given type of computer network was very much tied to the type of computer hardware (i.e. **mainframe** or **microcomputer**) that served as a **node**. However, as the price of computers has fallen and microcomputers have become more sophisticated, many early distinctions are blurring. Many of these terms

A computer network links two or more computers in different locations. One computer sends signals to a device called a modem, that is attached to or inside the computer. The modem changes the signals so they can travel over phone lines, and then sends the signals over phone lines to another modem. The second modem converts the signals back to computer signals and passes them along to computer number two. This process is fast, and if special phone lines designed for computer communications (called value added carriers) are used to send out of town messages, it can cost less than long distance telephone calls. Figure 2.1 (p.9) presents a graphic view of the components of a computer network. Figure 2.2 (p.10) presents a graphic view of the process of communicating via computer network.

Computer networks can be put to several uses. Mail that would normally be sent through a postal system can be sent via computer. This is called electronic mail, or e-mail. Computer networks can be used as community bulletin boards, where public notices of all sorts are posted. Along similar lines, **computer conferences** consist of messages or postings on a particular topic that, unlike early computer bulletin boards, are organized and linked. Another function of computer networks is **document transfer**. A document as small as a letter or as large as a book can be created on a personal computer, and sent over a computer network to another location where it can be transferred to another computer, and read. Finally, data bases available through computer networks allow people in different locations to share resources such as bibliographies and mailing lists. ARPAnet (discussed below) introduced electronic mail, (Licklider 1979 p. 112). In the strict sense of the term electronic mail refers to sending mail from one computer to another, where it is received by one or more people who have been specified by the sender. Like most mail sent through the postal service, it is private. Electronic mail was available only to subscribers of commercial computer networks and users of private (e.g., corporate) networks and networks that were not geographically dispersed until 1978, when two computer hobbyists introduced the first computer bulletin board system (Christensen & Suess 1978, p. 150).

Computer bulletin boards (BBS) were designed to exchange messages and computer programs. Initially they were devoted to computer hobbyists, who left messages about equipment for sale, technical problems and solutions, and exchanged "public domain"[4] or free software (also known as shareware). As bulletin boards have evolved, their uses have become more varied. A growing number of BBS are focusing on professional or business interests, and hobbies other than computers. Bulletin board topics cover everything from the sale of adult merchandise and dating, to posting the latest news released about AIDS. Unlike other forms of computer networks, using BBS is generally free of charge. The costs of starting and maintaining BBS are paid for by the **sysop**, short for **"system operator"** (Manning, 1984, p. 8). Though present day bulletin board systems often allow users to send and receive private messages, their primary function is for the exchange and dissemination of public information.

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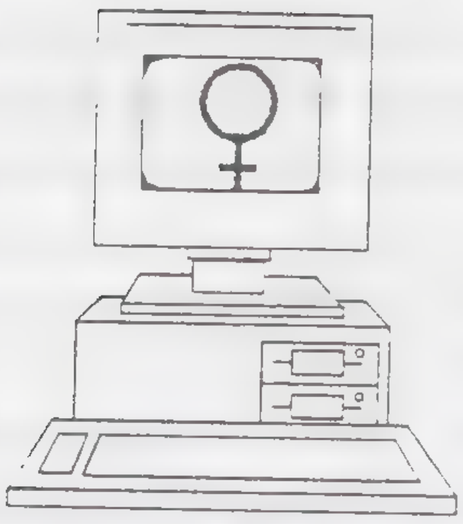
are still in common use, although the distinctions on which they were based are no longer accurate.

[4]Computer networks were introduced to the public in the seventies by two computer hobbyists, who set up a computer bulletin board for the exchange of technical information, hints, and the sale of used equipment. They developed the first computer communications program publicly available, and distributed it for free. In keeping with their spirit, as well as their concern for public access, several other communications programs have since been developed by hobbyists, and circulated free of charge or on a donation basis. Computer programs developed in this manner are called public domain programs, shareware or freeware.

Figure 2.1: Components of a Computer Network

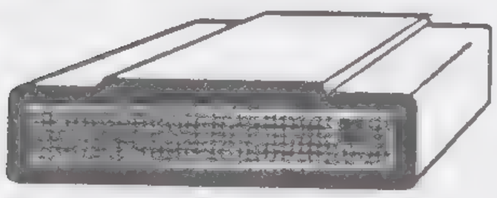


Computer of Terminal:

A computer can be used to perform tasks on its own (i.e. word processing). A terminal can only be used for entering and receiving data in a communications system.

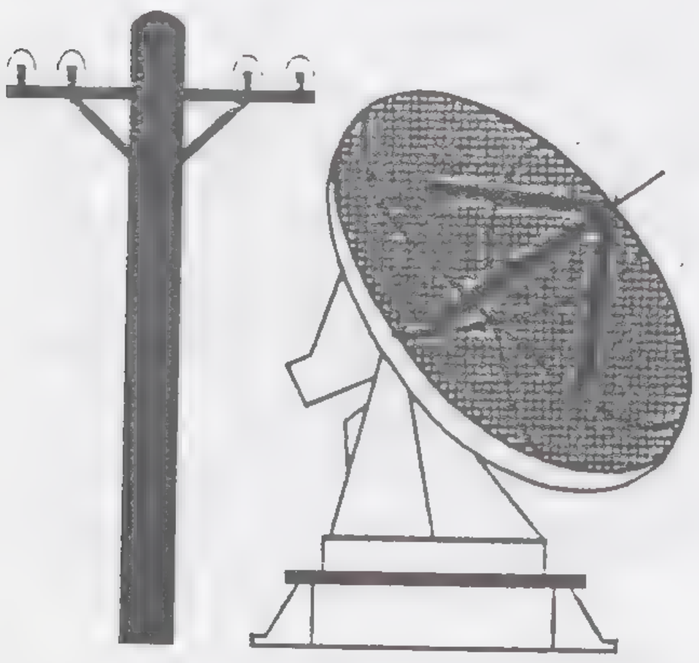
Communications Software:

A series of instructions which tells the computer what to do. Among other things, communications software tells a modem what to do.



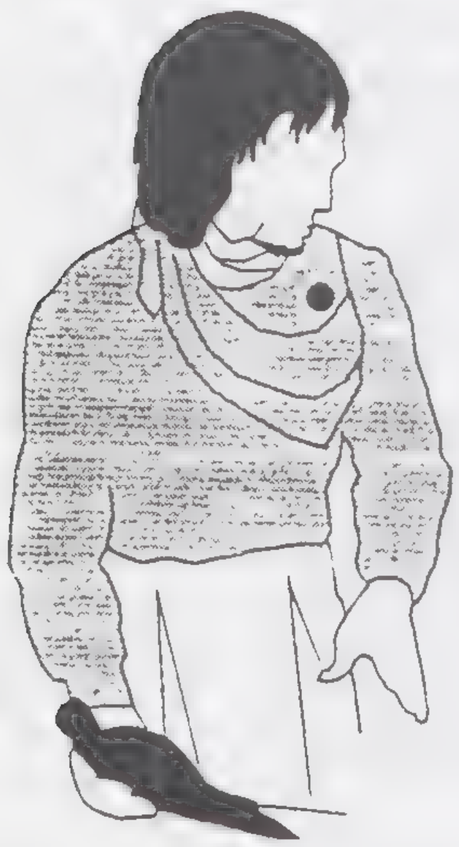
Modem:

A device that translates signals generated by a computer to signals that can travel over phone lines, and translates them back at the other end.



The Telephone System or a Data Carrier Network:

Carries electronic traffic. Regular phone lines or special lines designed for data transmission can be used.



People:

Someone on the other end to communicate with. Often engaged in trouble shooting when things don't work properly.

Computer conferencing was first developed in 1970 under contract to the U.S. Office of Emergency Preparedness, that was responsible for reporting and disseminating information about President Nixon's wage-price freeze. The conference system that resulted consisted of the computer counterpart of the telephone conference call, and an "on-line filing system" that stored topic specific messages that could be read and commented on by everyone who had access to the system (Meeks 1985, p. 169). Although some computer conferences are carried on in "real time," (e.g., all participants are connected to the "host" or central computer simultaneously, and messages are read and responded to almost instantly) this is less common than conference systems that allow participants to send messages to the host computer where they are stored, read, and commented on by others later.

The term "computer conference" refers to a collection of messages related to a particular topic, that remain available for an extended period. Typically a computer conference includes information about who reads and contributes to the messages, and a brief description of the topic. One feature that seems to distinguish bulletin board systems from conferences is the extent that messages are organized and the communication is structured. Conference messages tend to be more topic specific than bulletin board messages, and tend to read more like a conversation. Conference messages are often linked or cross referenced. In contrast, bulletin board messages tend to read like a bulletin board of not-necessarily related information.

Commercial communications networks available to the public typically include electronic mail, bulletin boards and conferencing, and on-line searching of **data-bases** that contain a variety of newspaper and magazine articles, reference materials and advertisements. In addition, one network allows subscribers to carry on individual and group conversations in real time by simulating a CB radio. Subscribers also can review airline schedules for all airlines and book reservations on selected airlines, and order merchandise from selected stores.

TYPES OF COMPUTER NETWORKS

As mentioned earlier, computer networks link two or more computers in different locations. The way that these computers are connected can be called the physical structure of the network. Although a range of services (electronic mail, bulletin boards, conferences, document transfer, and data bases) can be provided through computer networks, the specific services available on a particular computer network reflect social and economic decisions made about what hardware, software and physical structure are used to make up that particular network. In considering the use of computer networks for feminist community organizing, it is important to understand how social decisions affect the type of computer network, the range of services available, and ultimately, what communication and organizing options are potentially available.

Computer networks can be designed to be local, primarily serving people in a geographic area who can make local calls to the host computer (see Figure 2.3, p.13). Computer networks designed to meet local needs are typically computer bulletin board systems, that are run out of someone's home or small business on a personal computer. They are most often free of charge, (except if you call one that is out of town). This type of system is called a single node local system. The computer acts as a central node, and is responsible for passing messages between communicators.

Computer bulletin board systems are a common type of single node local network. Most bulletin boards allow users to 'post' and read public messages, send private messages (electronic mail) to one or more people specified (who also use that bulletin board), put documents on the host computer (known as uploading) or get documents from the host (downloading). Many bulletin board systems allow users to search the host computer for names of other bulletin board users, and some bulletin boards allow users to search public messages for a phrase specified, allowing users to locate information of interest more quickly. Although recent developments have resulted in bulletin boards that are similar to conferences, in general, computer conferencing is not available on bulletin board systems. Bulletin boards typically do not accommodate databases.

Although most bulletin boards serve people in a local area, there is a growing network of bulletin boards that 'talk' to one another, exchanging messages between computers in different locations. This type of computer network is a multi-node system, where each node is responsible for passing on messages sent to it by an adjoining node. If one could see this happen, it might resemble the child's game of leap-frog.

Perhaps the largest public (non-institutionally based) network of this sort is called Fidonet. It includes over one thousand bulletin boards worldwide. This makes it possible to call a bulletin board in Vancouver, and put a message on it for someone in Ottawa. (To do this, one needs to know the 'address' of the bulletin board in Ottawa). In the middle of the night, the computer in Vancouver automatically calls the computer in Ottawa, and deposits the message there. If all goes well, the message can be read the next day by the intended recipient. It has been estimated that the cost of sending messages in this manner is about twenty two cents per message. To cover these costs, Fidonet bulletin board operators typically charge an initial sign-up fee of five to fifteen dollars.[5]

Although the first multi-node bulletin board system (called PCNet) became operational in 1978, the idea for Fidonet and other bulletin board systems that are part of multi-node networks is usually credited to experience with a university/institutionally based computer network called Usenet, developed in 1979. De'Marrais (1985) refers to Usenet as an administrationless volunteer-maintained computer network of information anarchists. Thousands of multi-user computers (computers that allow several computer network of information anarchists. Thousands of multi-user computers (computers that allow several to use the same computer simultaneously) located primarily in universities and scientific institutions use the same software (Unix), and regularly pass messages between nodes. It is possible to send mail from any Unix system to any other Unix system, provided one knows the address of the destination system. Messages are sent in a leap frog fashion from one node to the next, until they reach the desired destination. Often calls made between two adjacent nodes are local calls. When two adjacent nodes are further apart than a local calling area, the cost of passing messages between nodes is absorbed by the institutions where the nodes are located.

To use Usenet and similarly structured systems, one composes a message, determines how it must be routed and sends the message. If the routing is wrong in any sense, the message gets sent back and the sender must again attempt to determine how it should be routed. With this type of computer network, a user at any given institution may have access to a wide range of

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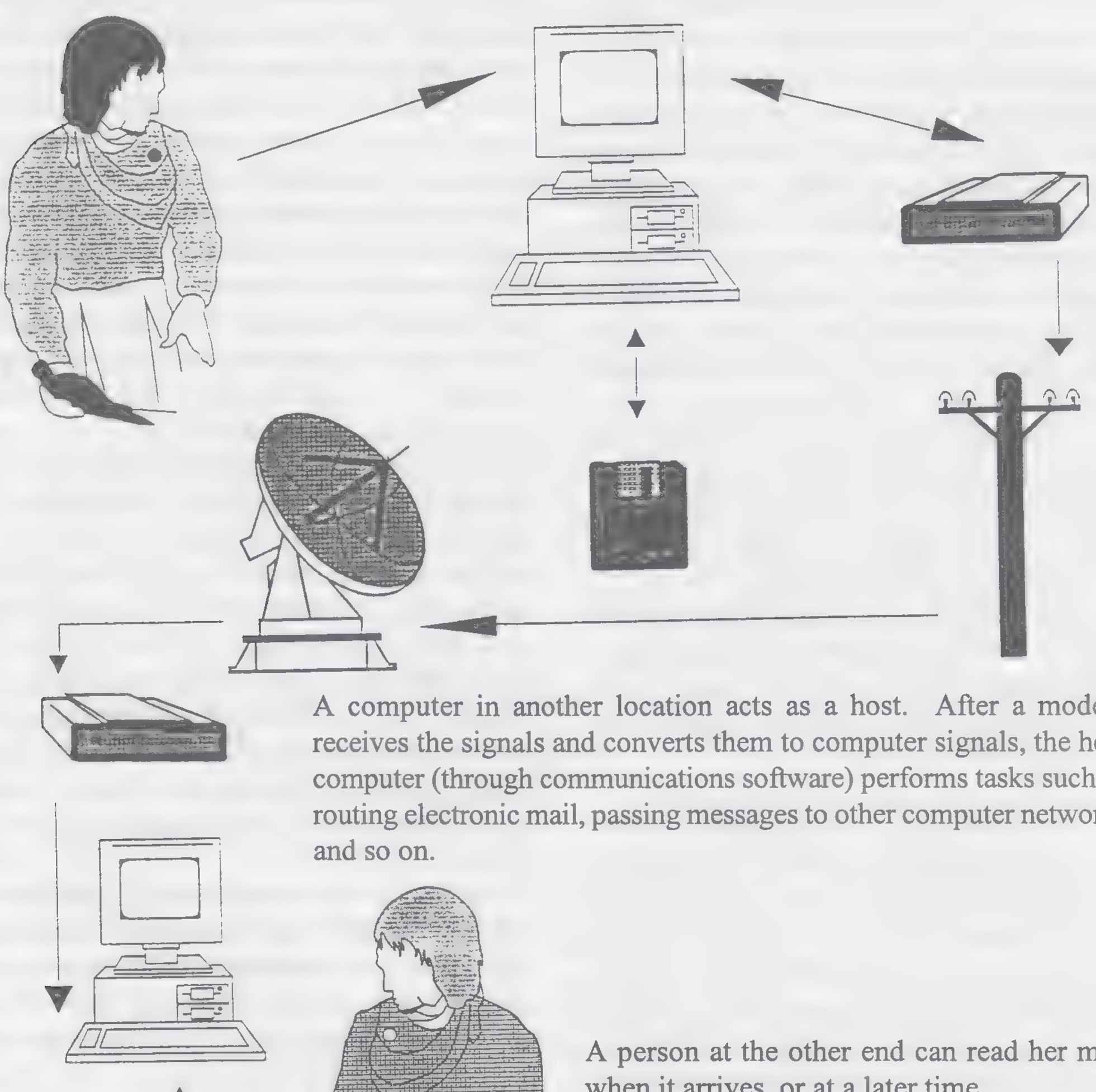
[5]From Fidonet computer conference (#86) on the Source Information Network, entry # 2, June 1988.

Figure 2.2: The Process of Computer Networking

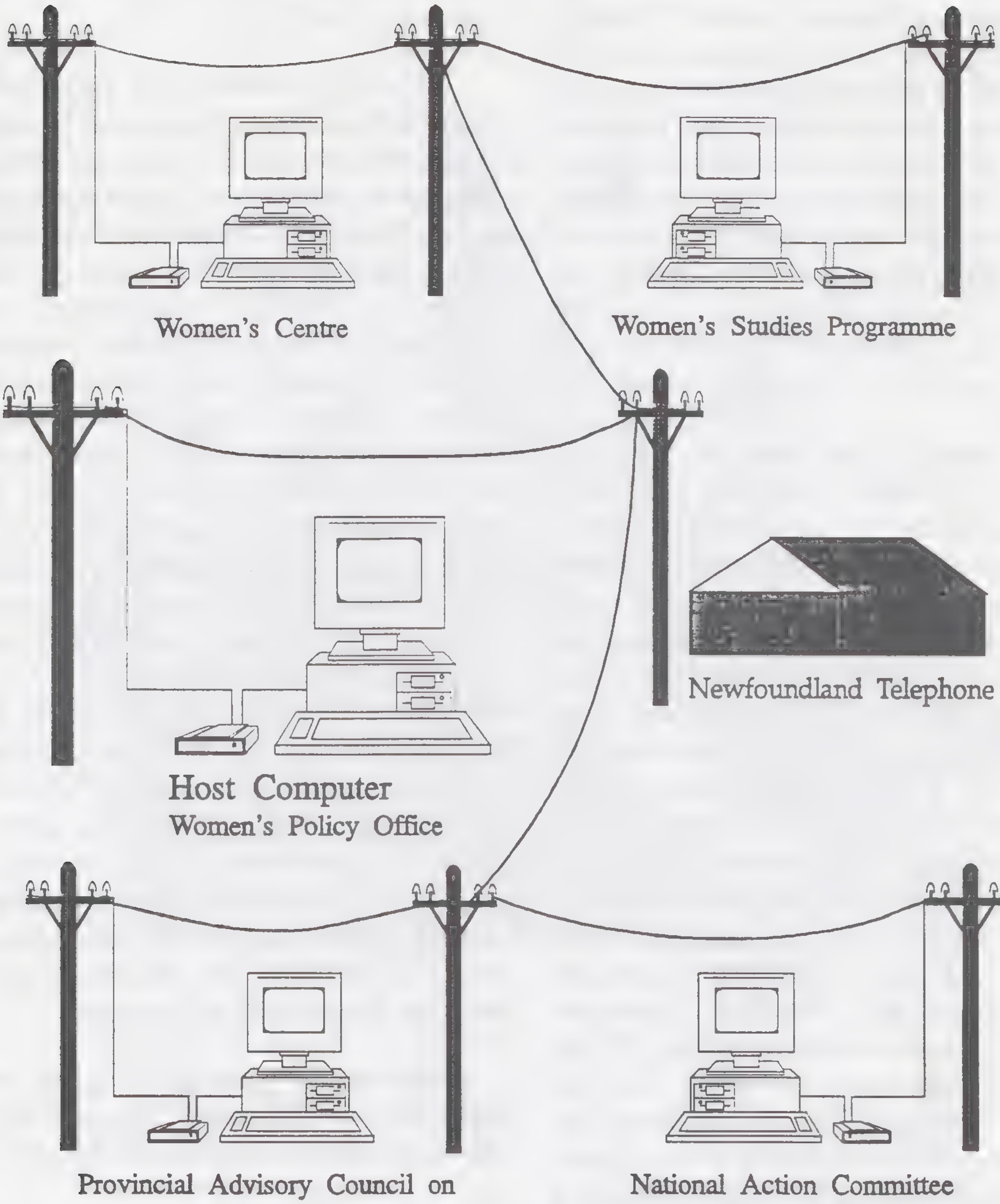
A person tells a computer to find the communications software, and initiate contact with the modem. Next, through the software commands are sent to the modem, which result in a call being placed. The modem converts the computer's signals so they can travel over local, long distance or data lines.



A computer in another location acts as a host. After a modem receives the signals and converts them to computer signals, the host computer (through communications software) performs tasks such as routing electronic mail, passing messages to other computer networks and so on.

A person at the other end can read her mail when it arrives, or at a later time.

Figure 2.3 Local Single Node Network


Women's Centre
Women's Studies Programme
Host Computer
Women's Policy Office
Newfoundland Telephone
Provincial Advisory Council on the Status of Women
National Action Committee on the Status of Women

Users at different locations in a local calling area connect to a host computer through the local phone system. Once connected to the host computer, users at all locations use software on the host computer to send and receive electronic mail and upload and download files. Users outside the local calling area can make long distance calls to the host computer.

services such as bulletin boards,[6] databases or computer conferences. However, users in other institutions who are communicating with someone through this type of network are not likely to have access to the full range of services that the local user does. These resources can only be used by people with direct access to that particular computer. Consequently, the only type of computer networking that can occur on a multi-node network such as Fidonet or Usenet is electronic mail. However, a few interesting variations of electronic mail have sprung from this type of system.

Imagine four hundred people in different locations who have not met in person, but have a shared interest such as women's issues. If these four hundred people are all at institutions with computers, they could form a mailing list. A location would be designated as a central location, where all interested parties could send messages relating to women's issues. Someone at the central location would compile these messages (leaving them as is or editing them), and then send them out in a bundle to the other three hundred ninety nine people on the list (see figure 2.4, p.15). Although I call this type of communications "**bundled electronic mail**," (similar to a **digest** version of a **list server**) in the context of Fidonet, it is often called "echo-mail." Bundled electronic mail can be public, in the sense that it can be read by anyone (the 400 people can send it to 400 others, and so on), or it can be private: that is, distributed to a smaller group of people who agree not to forward messages. This is how some of the first feminist computer networks (many are still in existence) operated.

A major problem with multi-node systems is the routing of messages. To send public messages, the routing to the central computer must be known. Private messages are sent directly to the desired individual, rather than the central address for the mailing list. Just to put this in perspective, when this study began, one friend's address was tekig4!kimh@tektronix.uucp; another friend's address was ehall%rondo@RAND_UNIX. ARPA. There was little in the way of convention when it came to computer addresses, and, if the address was wrong (capitalization, syntax or punctuation) the message was returned. Recent technical developments (Internet and new message transfer protocols) have fixed, but not eliminated addressing problems. To make matters more complicated, if one computer specified in the routing (address) changes its connections to other computers, (this sometimes happens without warning) a new address must be determined. The major advantage of a multi-node network is that it usually costs participants nothing to send messages thousands of miles away.

So far, the types of computer networks addressed have been local and wide area[7] computer networks that are low cost

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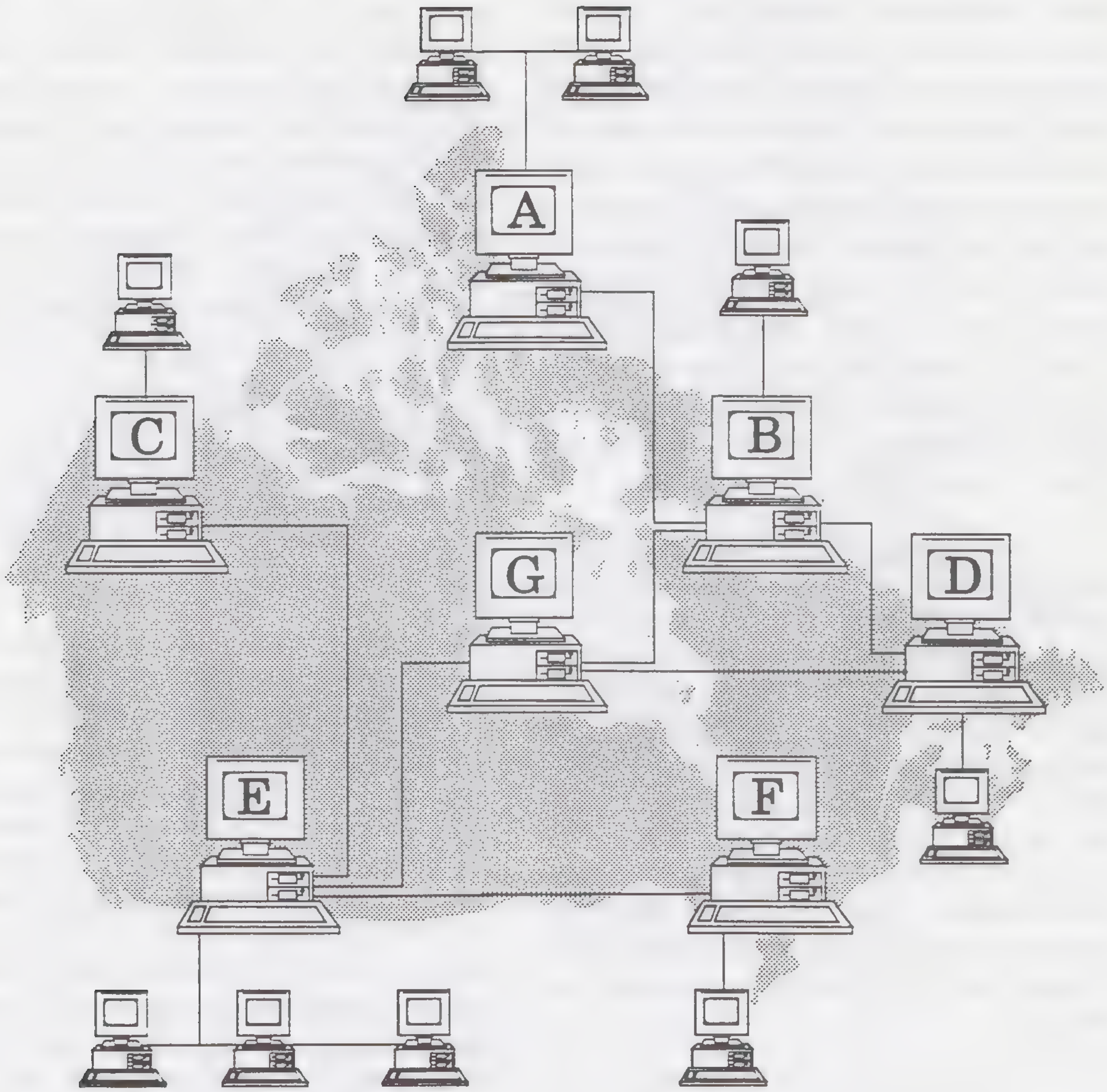
[6]Here I use the term bulletin board in its more common usage: a random rather than organized grouping of messages.

[7]Wide area networks (WANs) allow people to exchange electronic mail and use other networking services independent of their distance from the host computer. In contrast, local area networks (LANs) are physically hooked together by cable, and typically do not require the use of telephone lines and modems. LANs are used in small areas such as buildings.

Figure 2.4: Wide Area Multi-Node Network



Users connect to a local node and use the electronic mail software running on their local node to send and receive messages. It is possible to send messages between most nodes. The address from one node to another reflects pathways between those nodes. To run a bundled E-mail group, one node (i.e. G) is designated as a host node. Mail from all nodes is sent to that node, bundled and redistributed. Some nodes (i.e. E and B) forward mail to other nodes.

or free, but do not accommodate computer conferences or databases. The computer networks that do accommodate conferences and databases are typically single node wide area systems, usually run commercially for profit. People who use these systems can generally call a central host computer from anywhere in North America, over special telephone lines called value added carriers, or data carriers (see figure 2.5, p. 17). Value added carrier lines are designed especially for computer use, and are billed at a lower rate than voice phone lines for long distance. To take advantage of value added carriers in Canada,[8] a special line must be installed where the host computer is located, at a cost of around $2,500.00 (Personal Communications, John Bradley, October 1988).

Although local and multi-node bulletin board systems are usually run on small, relatively inexpensive computers such as those we are beginning to see in women's centers, commercial computer networks are run on larger more expensive computers. One difference between the smaller and larger computers (these differences are blurred as personal computers become more sophisticated) is that the larger computers allow several people to use them simultaneously. They may also have the additional space for storing information that is required for computer conferencing and databases.

In addition to the types of services discussed so far, mainstream commercial computer networks also offer home shopping, stock market and sports information, electronic encyclopedias, newspapers and magazines, and a variety of other services. Network users are charged an initial sign up fee and a per minute usage fee, and occasionally, a monthly minimum. A computer network can be organized in this fashion (a single node wide area system, for example that is accessible throughout the country or world), but run on a non-profit basis, as is true of PeaceNet. Information exchange is targeted towards a different population from the commercial networks, and non-profit operation substantially reduces costs.

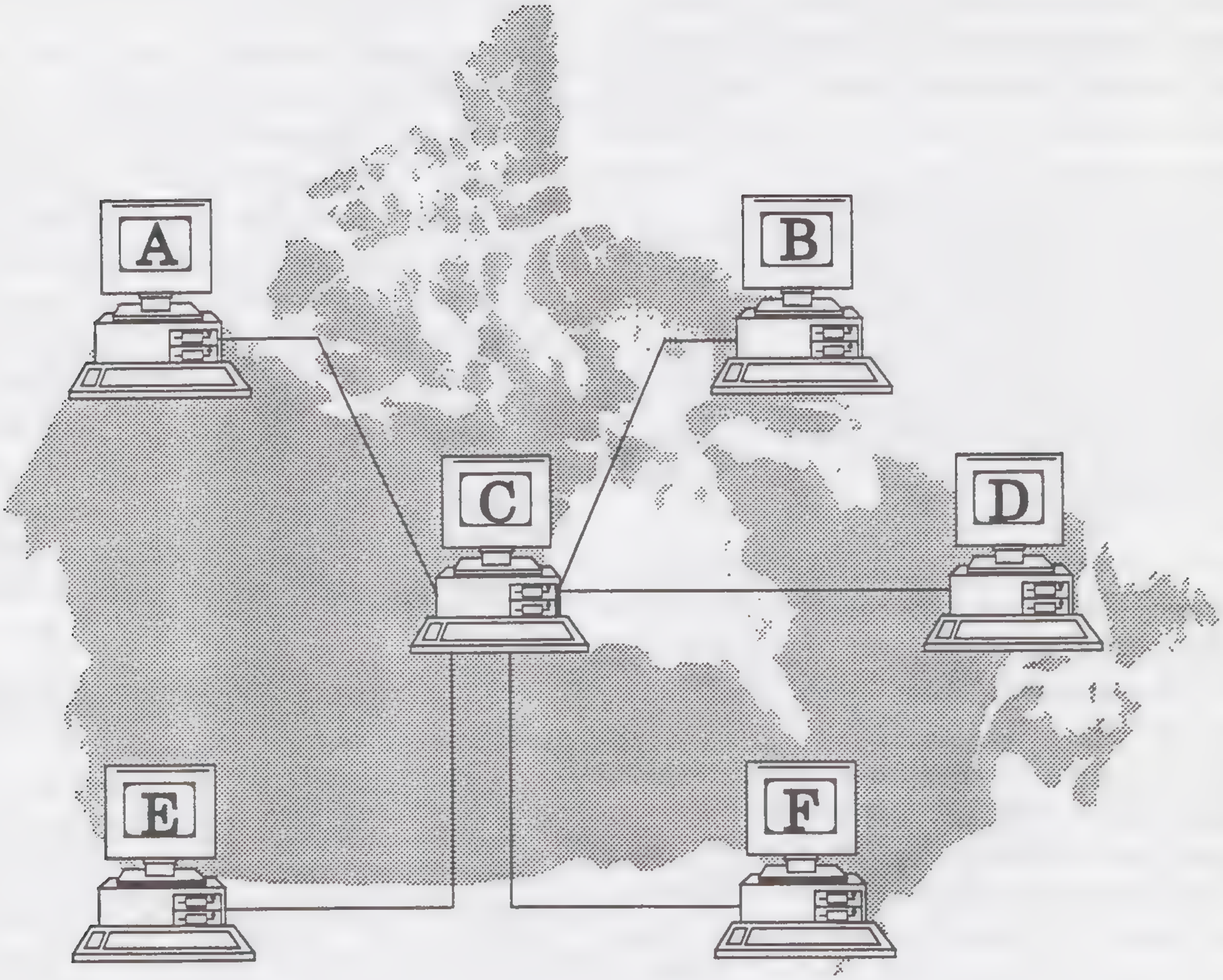
A BRIEF HISTORY OF COMPUTER COMMUNICATIONS NETWORKS[9]

Although the first computer network was not in operation until 1968-69, in some senses the development of computer networks can be traced back to 1959, when development of the world's first time-shared computer system began at the Massachusetts Institute of Technology (MIT). Before the development of time-sharing, large, expensive computers could only work on one task at a time. The result was that computer time had to be booked ahead, and turn-around time for completed tasks was slow. Computer networking made no sense prior to the development of time-sharing, as the act of sending or receiving information would have tied up the entire computer system.The project

[8]In the U.S., one of the major value added carriers (companies that sell access to phone lines for use for data transfer, rather than voice calls) began a service called PC Pursuit. The service was targeted towards microcomputer hobbyists, who can use the data carrier lines for an unlimited amount of time in the evenings for a flat fee of twenty five dollars per month. Canada's major value added carrier has begun making its services more accessible. It is possible that Canadians will soon have a service such as PC Pursuit available.

[9]In reading this section and the next, it is perhaps useful to keep in mind that microcomputers became available in kit form in 1975, and in a fully assembled ready to hook up form only in 1977. The first commercial computer program designed for a personal computer and an inexperienced user was introduced two years later (Blissmer, 1985).

Figure 2.5: Wide Area Single Node Network



Users at all sites place calls (through regular long distance phone lines or data lines) to node C. Once connected to node C. users at all sites use software on the computer at node C to send and receive electronic mail, participate in computer conferences, search databases and upload and download files.

to develop time-sharing took place between 1959 and 1962 and resulted in a working model of a time-sharing system known as the Compatible Time Sharing System (CTSS). The project was funded by the United States Office of Naval Research and the Advanced Research Project Agency (ARPA), that was housed within the Department of Defense. Although other time-sharing systems were under development then, the CTSS development yielded new goals and standards for the development of time-sharing systems. In keeping with the military interest in this technology, the goals of the CTSS project included the development of sophisticated control over user access to the system (including files on the system), and an automatic cost accounting system for billing customers (Denicoff, 1980). Before this time computer use had been informally restricted (if at all), and access to the work of others on the computer was unhindered (Levy, 1984).

In 1963, a decision was made to extend the time-sharing research project at MIT. The expanded project, known as MULTICS[10] had as its goal the explicit definition of the desirable features for a time-sharing system, and the construction of a system that would incorporate these features. Bell Labs with ARPA became both a funder of and participant in the MULTICS project that took place between 1963 and 1968. It yielded a reliable computer that could simultaneously support the activities of between forty and fifty users. The success of the MULTICS system helped prove the viability of time-sharing computers; by the end of 1968, over forty commercial time-sharing computer system were in operation in Washington D.C., in the United States (Denicoff, 1980).

During the same period, Paul Baran, working at the RAND Corporation under contract to the U.S. military developed a method of transmitting data called **packet switching**. Packet switching breaks information sent through a computer terminal into numbered packets, and transmits them in bursts over a web-like data network. The packets are reassembled as complete messages at the receiving end. Each packet can travel many different routes, and packets can be sent several times. Packets are sent over the first open path, which could be a straight line or a large circle. The result is that messages can be sent over a computer network, even if over half the network is down (Baran & Emerson, 1979). Value added carriers (such as Datapac in Canada and Telenet and Tymnet in the U.S.) are commercial packet switching networks. Although the concept of electronic networking is usually attributed to L.G. Roberts of ARPA, who in 1968 defined networking as a set of autonomous, independent computer systems, interconnected to permit resource sharing between any pairs of systems (Denicoff, 1980), it appears that the U.S. military may have been working on this project before 1968.

The concept of electronic networking, as conceived by Roberts was based "on the hope that science itself would profit, that real improvements in scientific achievement could result from greater human-to-human computer communications among researchers working in similar areas" (Denicoff p. 373, 1980). However, in discussing packet switching (the first computer network developed, ARPAnet was also the first packet switching network), Baran and Emerson (1979) argue that the goal of packet switching "was not to improve the state of the art of computer communications networking, but to assure military survivability" (Baran & Emerson, p. 30, 1979).

With the joint mandate of creating an ARPA network between ARPA sponsored university and think tank research centers that would employ the new technology for research concerned with furthering network

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[10]MULTICS stood for Multiplexed Information and Computing Service (Denicoff, 1979, p. 372).

development, and demonstrating that the global cause of better science would be enhanced

through the networking philosophy, development of the ARPA network began. Staff from a private firm (Bolt, Beranek & Newman), the Stanford Research Institute, Lincoln Labs (at MIT), UCLA, and the University of Utah joined to work on the ARPA network (Denicoff, 1980).

The concept of an electronic network became a reality in 1968-1969, when four University computer systems were linked, producing the first **wide area multi-node computer network**. Electronic mail could be sent between individuals working on different computers in different locations. By 1975, the ARPA network had developed to a system of fifty host computers with 38 sites in the continental United States and Hawaii, and connections in Norway and England. In 1976, management and maintenance of ARPAnet was transferred to the United States Defense Communications Agency. The same year, more than ten commercial firms were marketing computer networking services to corporate clients (Denicoff, 1980).

ARPAnet was not the only computer communications effort to grow out of the United States military in the late sixties and early seventies. At the same time that development and implementation of ARPAnet was occurring, the U.S. Office of Emergency Preparedness (OEP) in the Executive Office of the President formed a Systems Evaluation Division (SED). The SED engaged in operations research, that was directed towards the development of computer tools for managing emergencies. One SED project involved the exploration and use of Delphi polling and forecasting, carried on between users in different locations connected to the main OED computer via computer terminals and phone lines.

Without any formal authority to do so, a programmer working for the SED (Murray Turoff) suggested to another programming group in the OEP that some changes should be made to the OEP computer system. These changes resulted in the possibility of implementing an on-line Delphi poll. Again, lacking formal authorization Turoff began to implement an automated version of Delphi polling on the OEP computer system. The system was implemented in about six months, the work towards its completion being carried out between official tasks (Hiltz & Turoff, 1978).

In the spring of 1970 an experiment with the computerized Delphi system began. For seven weeks twenty people from around the United States engaged in on-line structured discussions, before members of the OEP found that not only was their computer system being used for unauthorized purposes, but it was being used by people outside the Washington D.C. OEP. Amidst organizational and political struggle, the experiment with the computerized Delphi system was allowed to run to its end, for a total of thirteen weeks. Turoff was publicly reprimanded, however his superior unofficially provided him with the resources to continue work on the project (Hiltz & Turoff, 1978). This experiment appears to have been the first example of **a single node wide area computer network**, where software was provided for more structured communications than electronic mail.

In 1971, when the U.S. president instituted a wage-price freeze, a real need arose for a system such as the one on which Turoff had been working. Additional work was carried out on the previously developed computerized communication system. The new system, called EMISARI (EMISARI stood for the Emergency Management Information System and Reference Index) was used to coordinate communications between the federal and regional OEP offices during the wage-price freeze. Development of EMISARI continued after the wage-price freeze.

New features included an incident reporting system called IRIS (used to alert branch offices about incidents such as violence during a strike), and features that allowed data on the system to be interrelated. The system was used subsequently by the OEP for monitoring and managing crises, including the voluntary petroleum allocation program (commonly known to Americans as the gas crisis), and a truckers' strike. The SED and OEP were eventually dissolved, and their functions were taken over by newly created departments, that still use the system to manage the American public (Hiltz & Turoff, 1978).

Between 1968 when ARPAnet first began, and 1976, other computer networks were implemented in a variety of institutional settings. Notable among them was a system similar to the EMISARI system, designed by Bell Northern Research (a wing of Bell Canada), and implemented on their mini-computer. A unique feature of this system was its bilingual user interface. Upon accessing the system, users could indicate a preference for French or English dialogue with the computer. Subsequent questions or choices were presented to the user in the selected language. However, once text was entered into the system, it remained untranslated (Hiltz & Turoff, 1978).

Also built on the early Delphi/EMISARI model was the Institute for the Future's FORUM computerized conferencing system, begun in the early seventies. The Institute for the Future initially focused on real-world trials of computer conferencing and the development of methodologies for monitoring computerized communications. In addition, they engaged in the evaluation of the strengths and weaknesses of emergent computer communications technology (Hiltz & Turoff, 1978). By 1979, the system developed at the Institute for the Future was being managed by a corporation as a business network (Kliener & Davis, 1979).

Finally, the Electronic Information Exchange System (EIES) began operation in October, 1976. With funding from the National Science Foundation in the United States, EIES was organized by Murray Turoff, who left his previous military employer after departmental reorganization occurred (Hiltz & Turoff, 1978). EIES quickly gained a reputation as "probably the most influential [system] in developing social contexts in which people will find each other through computers" (Kliener & Davis, p. 117, 1979). Access to the EIES system (EIES was the site of perhaps the most extensive analyses of users of computer systems) was granted on an application basis. Limited funding was available for a three month trial period; otherwise, "people with a reasonable idea about using the system" (Kliener & Davis, p. 117, 1979) could purchase membership slots for sixty-six dollars a month, plus an hourly use fee. Or, for one hundred thousand dollars, groups could buy the hardware to create their own EIES system, with software and maintenance costs extra (Kliener & Davis, 1979).

THE USE OF COMPUTERS FOR SOCIAL CHANGE WORK

Around the same time ARPAnet became operational, Lee Felsenstein met Jude Milhon and Efrem Lipkin in Berkeley, California. All three were both computer programmers and activists. Although they had differing beliefs about the extent that computers could be used in the context of activism, they began a discussion on the topic that lasted for several years (Levy, 1984; Interview with Lipkin & Milhon, June 23, 1988). By 1971, Felsenstein had begun working with a group called Resource One, that was part of a larger group called Project One. Project One was an umbrella organization of Bay Area groups involved in fostering community activism.

Project One had been started by an architect-engineer to meet three social goals.

First, it was to act as a mechanism for giving unemployed professionals something to do with their skills. Second, it would help the community, and third, it would contribute to dissipating the aura of elitism and mysticism surrounding technology. The Resource One collective (only one of several projects housed in the Project One warehouse in San Francisco) consisted of people who believed "that technological tools can be tools of social change when controlled by the people" (Levy, p. 164, 1984). Resource One had convinced the Transamerica Insurance Corporation to lend an unused time-sharing computer to the group, so the group could engage in an ambitious combination of projects including gathering alternative mailing lists, conducting computer education, embarking in economic research projects, and demystifying computer technology for the public.

Although the idea behind Resource One was to provide computer resources for community embers and groups, in reality, the Resource One computer was largely inaccessible- anyone wanting to use the Resource One computer had to plead their case before the Resource One collective. This had a tendency to limit hands on experience with the computer, rather than foster it the type of hands on experience Felsenstein had hoped for. At around the same time Felsenstein became disenchanted with the bureaucracy of the Resource One, Efrem Lipkin resurfaced in California and got involved with Resource One. Lipkin shared many of Felsenstein's feelings about how ineffectively the Resource One computer was being used. He began thinking about taking computer power to the streets, and got Felsenstein hooked on the idea. The result was that Resource One formed an offshoot of Project One with some funding from that project (Levy, 1984). Initially, the computer remained at Project One, and was accessed through terminals in Berkeley. Eventually the off-shoot project acquired its own computer in Berkeley, which became the Community Memory Project (Clement, personal communication, August, 1991).

Community Memory advocated community based information centers rather than computer terminals in private homes. They also criticized the commonly found vertically organized computer systems (designed primarily for the delivery of pre-selected information) in favour of programs accommodating horizontal flows of information between users, as well as system managers and system users (Creative Computing, 1975). In 1973 a three terminal Community Memory system was implemented and kept running for fourteen months. Terminals were located in a Berkeley music store, a "hippie" hardware store, and a library in the Mission district (a poor area of San Francisco). Anyone was free to place messages on the Community Memory system, or seek information from it (Athanasiou, 1985). Messages on the system were indexed according to key words by authors, and could be located by key words by subsequent readers.

San Francisco's Community Memory was not the only computer project of the time based on activist ideals. A similar project (sometimes called INFACT) was implemented in Vancouver, British Columbia between 1973-1975. Similar to the San Francisco project, in Vancouver terminals appeared in a public library and a community information center. Unlike the San Francisco project, the Vancouver Community Memory was run on a university computer, with time donated by the university. Although the Vancouver implementation was more problematic than the California implementation, the range and breadth of items entered into the system was similar to the U.S. implementation. Both experiments were ended because of problems with computer support. In Vancouver, the donated computer time ran out, and project funding (that covered rent and personnel) ended. In California, the project was

halted[11] because it was felt that the computer it was originally run on could not support the type of expandable, modular, inexpensive system the designers had originally envisioned (Emerson, 1978).

Another project aimed at bringing computers to the people was the People's Computer Company. In October of 1972, a small "for profit" programming company in San Francisco called Dymax published the first issue of *The People's Computer Company Newspaper*, based on the model of the Whole Earth Catalogue. The success of the paper led to a non-profit spin-off of Dymax called The People's Computer Company (PCC), that included the publication of the PCC paper, and the operation of a computer center in a Menlo Park, California shopping mall. PCC ran classes and offered off-the-street computing for fifty cents an hour to anyone who was interested. When microcomputers appeared on the commercial market, PCC provided free information to prospective buyers. A group of volunteers connected with PCC developed and organized PCNet in 1978. PCNet was the first wide area multi-node computer network catering to personal computer users.

EXPANSION OF COMPUTER NETWORKING

Hiltz and Turoff (1978, xxix) wrote that the first computerized conferencing system was created in 1970, and by 1978 the use of such systems was limited "to tens of organizations and a few thousand people." Just over a decade later, one commercial computerized networking service alone reported five hundred thousand subscribers (Gerber, 1989). Clearly, computer communications and networking technology has been both rapidly diffused and adapted in North America.

Although ARPAnet introduced electronic mail, use of ARPAnet was restricted to people at U.S. military funded sites for many years. Electronic mail was available only to people at ARPA sites and subscribers of single node wide area computer networks such as EIES and users of private (e.g., corporate) networks until 1978. The introduction of the first commercially available microcomputer in 1975 (Levy, 1984), and the development and free distribution of computer bulletin board software in 1978 (Christensen & Suess, 1978), hastened the adoption of computer networking technology.

By the early 1970s, a predominantly (if not entirely) male cultural phenomenon known as 'hacking' had evolved in North America (Levy, 1984). Levy traces the term to a student club at the Massachusetts Institute of Technology (called the Tech Model Railway Club, or TMRC) in the late 1950s, referred to "a project undertaken or a product built not solely to fulfill some constructive goal, but with some wild pleasure taken in mere involvement" (Levy, p. 23, 1984).

During the 1960s, many TMRC members shifted their attention away from hacking model railway equipment, and instead became absorbed in the world of computer hacking. Many of these students became obsessed with computers (a common result of this obsession was to flunk out of MIT), and were hired to work on projects such as the development of time-sharing computers and ARPAnet. Eventually students would be nudged out of MIT, relocating to other parts of the country (particularly California), where they kept in touch with friends at MIT via ARPAnet. As this happened, the term 'hacking' began to

[11]Depending on the source consulted, San Francisco's Community Memory either disbanded after the initial project in 1975 (Athanasiou, 1985) and reformed with many of the original members as well as some new members "years later," or, never really ended (Emerson, 1978).

assume a universal meaning of sorts, referring to obsessive behaviour with computer equipment (Levy, 1984).

By the early 1970s, many people who had worked in the military, government, scientific, and engineering environments (including academia) had been exposed to computers. Many of these people were anxious to have greater access to computers than their work environment afforded, and many of them were hackers. Before 1971, when the first **microprocessor** chip was marketed commercially, the cost of building or marketing a computer for home use was prohibitive. With the availability of microprocessors (microprocessors are in a sense the backbone of **microcomputers**) the potential of building a small computer existed.

Although many hackers experimented with building small computers for personal use between 1971 and 1975, it was a small company in New Mexico that produced the first successful commercially available micro-computer. MITS (MITS stood for Model Instrumentation Telemetry Systems) had begun as a model rocketry company, moved into test equipment, digital clocks, and small microchip based calculators. When companies such as Texas Instruments entered the calculator market and manufactured their own chips, MITS was left close to bankruptcy. As MITS approached bankruptcy, MITS' founder, who had worker with computers while in the Air Force, speculated that the introduction of a commercially available personal computer (in kit form) could save his company. Simultaneously, an editor of *Popular Electronics* magazine was looking for a cover story that would get him a raise; the two met, and an advertisement for MITS' Altair computer in kit form (the Altair at the time only existed as a prototype) appeared on the January 1975 cover of *Popular Electronics* (Levy, 1984).

Although MITS expected to sell only four hundred kits in the first year (at a price of three hundred ninety seven dollars for a basic kit), within three weeks of the appearance of the article in *Popular Electronics*, MITS had repaid all debts and banked a quarter of a million dollars. Once an Altair kit had been obtained from MITS (MITS remained back ordered for over a year), the user had to figure out how to put several bags of parts together. The parts were not pre-tested and sometimes did not work; soldering and a great deal of innovation were required. Once a kit was put together, computer programs were entered by switches in a base eight number system (there was no keyboard). If the program ran correctly lights on the front blinked back in base eight; there was also no display screen. Finally, when the machine was turned off, everything was lost (Levy, 1984).

Although the Altair was a commercial success, several people realized its limitations. Almost as soon as it appeared various people began designing microcomputers that would be more useful. One of the next computers to enter the market (also in kit form) was the Sol, designed by Lee Felsenstein. Unlike the Altair and others, the Sol was a complete computer, with a built in keyboard and a display screen (Levy, 1984). In 1976, three companies (Apple Computer, Radio Shack and Commodore) either announced or made available completely assembled personal computers (Blissmer, 1985).

Two months after the Altair was introduced a meeting was held in California that resulted in the formation of the Homebrew Computer Club, which was the first computer user's group in North America. Its function was to bring people building computers together to exchange information, ideas and to help with projects (Levy, 1984). Members quickly found that it was also a good place to exchange computer parts and software, that at the time were not commercially available for

microcomputers. Three years later, computer clubs had sprung up all over North America, alongside the growing microcomputer market. Although complete microcomputers were available, their use was still limited very much to computer hobbyists and hackers. Each machine that came out required its own software. Software was often written by the end user, or obtained free from another owner of the same brand of computer.

To generate material for a computer club newsletter, Ward Christensen came up with the idea of creating a computerized bulletin board.[12] Like the face-to-face computer club meetings, it was intended to serve the needs of hobbyists and hardware enthusiasts (Christensen & Suess, 1978). Before the advent of microcomputer bulletin board systems, computer to computer communications took place between two large time-sharing computers (ARPAnet), or between a terminal and a large time-sharing computer (such as EMISARI or EIES). Access to such systems was restricted, and control of communications was centralized. Although decentralized computer communications systems were possible prior to the development of microcomputers, with the exception of Community Memory, none had been implemented. The introduction of microcomputer based bulletin board systems accommodated the development of a non-profit non-institutionally based computer communication network.

In 1977, an article in a personal computing magazine[13] explained plans for PCNet; a personal computer network that would be decentralized, with no central switching computer. The author of the article explained that this was a political decision, as decentralized networks are harder to control (Kliener & Davis, 1979). Caulkins (who organized PCNet) saw it as a way of "increasing the 'grassroots' communications bandwidth -- the amount of information flowing between people under their direct control, unmodulated by larger organizations with various axes to grind or sell" (Athanasiou, p. 43, 1979).

The resulting network, PCNet, was a nationwide electronic mail system for Commodore Pet personal computers. PCNet appears to have been implemented sometime in 1978 after the introduction of Christensen's and Suess's computer bulletin board in Chicago.[14] PCNet was run by a committee of volunteers through the People's Computer Company (Kliener, 1981). Kliener notes that by 1981, other programs had begun to appear that were built on the same model, but using different rules for moving messages between computers. Although the PCNet committee was attempting to set standards for this type of network, they appear to have failed.

The idea of a network based on the PCNet model spurred the development of similar systems, including many that outlived the original PCNet. Another early implementation of this idea was the CBBS, standing for the Community Bulletin Board System. CBBS (still in operation) was described in 1979 as an electronic mail system that "allows short messages to be easily distributed

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[12]Although Kleiner and Davis (1979) refer to an article about PCNet (a network for Commodore PET computers), and Christensen and Ward (1978) also mention PCNet, Townsend (1984) credits Christensen and Ward with the first microcomputer bulletin board system.

[13]The article, by David Caulkins appeared in the October-November 1977 issue of *Personal Computing*, a short lived publication that didn't make it into many libraries. Mention of the article is found in Kliener and Davis (1979), along with mention of another article by Caulkins which appeared in *Co-Evolution Quarterly*, sometime prior to 1979.

[14]Very little information exists about PCNet. It appears to have ceased operation sometime after 1981. This was probably related to the fact that it was designed for Commodore PET computers, which saw a decline in sales as other personal computers were introduced commercially.

within a local area" (Athanasiou, p. 42, 1979). In 1979, CBBS had been implemented in eight U.S. cities (Athanasiou, 1979).

Based on a concept of decentralized networking similar to that articulated in relation to PCNet, Usenet (probably the largest computer network in the world) did not spring from the desire to bring computer access into the home. Instead, Usenet grew out of workplace access to a computer system (Unix) that was developed in a largely unorganized fashion by hackers who constantly modified the system. Usenet was originally conceived as a research project by two workers in Bell Labs in 1969. Throughout the 1970s Unix was licensed almost exclusively to universities, since AT&T was prohibited from competing in the commercial computer business (PC Week, 1988). Perhaps consequently, Unix has never been supported by AT&T as a profit-oriented product (Waite, 1987).

Unix is based on the notion that the best way to meet a computing need is to add a few simple, general commands (Franklin, 1987). When several simple commands are combined, a sophisticated task can be accomplished. However, in order to be useful, the user must rely on extensive knowledge of both the commands and how they work together. Consequently, Unix has a reputation of being technically sophisticated at the expense of user friendliness. Successful use of Unix depends on memory, rather than intuition (Waite, 1987). Its user interface is not well suited for anyone who is a non-programmer. Unix development appears to place the convenience of system developers above the convenience of users. Many of the difficulties with Unix derive from the environment surrounding its development: "a research environment in which each researcher who needed a command just wrote it. There were no standards committees or formal reviews before a command could be installed on the system" (Franklin, p. 21, 1987). Compounding difficulties, beginning in the late 1970s funding for development work on the Unix system was granted to the University of California at Berkeley. This led to additional system incompatibilities (Franklin, 1987).

In 1979, another important development occurred in relation to Unix. Two graduate students at Duke University (in North Carolina) decided to try hooking two Unix based computers together, to facilitate the exchange of information within the Unix community. A third student from the University of North Carolina wrote what has become known as the news (or Netnews) software, that forms the keystone for Usenet (Spafford, 1991a). Unix news software provides ways for users to access, read and send messages (called articles) anywhere using the Unix news software.

Development of Usenet has proceeded very much like earlier development of Unix; it is constantly modified by programmers. In 1980 the news programs were rewritten and made publicly available, free of charge. In 1982, the programs were again revised to accommodate a better organization of topical newsgroups and the growing number of sites receiving Unix newsgroups (Anderson, Costales & Henderson, 1987). By 1984, the increasing volume of mail had become problematic. This led to the addition of a feature that would allow moderated newsgroups, inspired by ARPAnet mailing lists (before this time all Usenet content was unmoderated). In 1986, another revision of Netnews made possible a revised naming structure for newsgroups. Developments since 1986 have focused on how users reading Usenet news can 'process' the material they receive over the network (Gilmore & Spafford, 1991). In other words, recent changes have been focused on a user's ability to select and manipulate what they see and how they see it. By 1987, more than 5,000 sites were participating in Usenet, with more than 150,000 readers. Most sites are in North America. However Usenet is growing

in Australia, Asia and Europe (Anderson, Costales & Henderson, 1987).

Unlike most personal computer based bulletin board systems or commercial computer networking services (see below), Usenet is not controlled by a single person or group who establishes policy and rules for use, and maintains the message base and equipment. Usenet requires no membership screening, no dues, and boasts little organization. Often described as a grass roots network based on controlled anarchy, the costs of running Usenet are absorbed by the institutions where Usenet sites are located. Usenet is viewed as a valuable source for the dissemination of knowledge, and an aid to researchers (Anderson, Costales & Henderson, 1987).

Usenet can be thought of in terms of a series of layers. Users at an institution are connected to a computer running the Netnews software through a variety of methods, including a direct physical connection, cables, a modem and phone lines, or a local area network. The next level is a network (such as ARPAnet or UUCP, that is similar to ARPAnet but designed specifically for Unix machines) that manages the transfer of message files between sites. The Netnews software (designed to run with minimal attention) manages the tasks associated with moving information between various sites throughout the network. Although theoretically a given batch of messages could be sent directly between any two machines in the Usenet system, this would be both costly and slow if every site had to send articles to every other site. To avoid these constraints, each Usenet site communicates only with selected nearby sites (Anderson, Costales & Henderson, 1987).

Some sites, called backbone sites, act as a regional clearinghouse for batches of messages. They collect messages posted from nearby sites, receive messages from at least two other backbone sites, and forward news from their region to at least two other regions. Backbone sites feed the messages collected from other sites to local sites, where they are topically organized into newsgroups (specified by the author), or distributed into individual mailboxes. Each backbone site eventually receives messages from all over the network. (Anderson, Costales & Henderson, 1987). Figure 2.6 (p.27) provides a graphic view of Usenet organization. Unlike bundled e-mail, where messages can be chronologically ordered by a moderator, Usenet newsgroup articles appear at each node in an order that reflects the time required for a given message to travel from its point of origin to its destination.

Although the software that keeps Usenet working was designed to minimize centralized organization and control, over the years several conventions have evolved with Usenet's growth that keep the system running more or less smoothly. Users at any site are free to create or distribute newsgroups, however backbone sites are also free to forward or reject any newsgroup. On a network-wide basis, a number of general operating principles that cover everything from general guidelines for message composition and manner (netiquette) to the procedure for starting a newsgroup or altering a newsgroup's content are determined through a voluntary polling procedure.

A few newsgroups exist for administering the network. Among the topics covered in these are proposals for new groups, proposals to alter groups, discussions about how to reduce 'noise' on the network, proposals for network organizational changes (such as the new group naming hierarchy introduced in 1986), and groups where results from votes are made publicly available.

Figure 2.6: Wide Area Multi-Node Network (Usenet)

Nodes marked with the letter B are Backbone sites. Nodes marked with the letter F are feeder sites. All small computers represent local sites. Backbone sites collect messages from nearby sites, receive messages from at least two other backbone sites, and forward messages to at least two other backbone sites. They also feed messages from other sites to nearby feeder and local sites. All backbone sites eventually receive messages from all over the network. Users at all sites use similar software. Messages are received in a different order in all locations.

Statistics about the network itself (for example, which groups are receiving the most message traffic, who on the network is contributing the largest quantity of messages) are automatically collected and posted regularly. Participation in these newsgroups is much like participation in a co-operatively run organization where the membership at large is welcome to attend management meetings, but not required to do so.

The content of Usenet newsgroups is varied. A complete listing of newsgroups available through Usenet, (with one group listed per line) produces in excess of 20 pages. A naming hierarchy for newsgroups incorporates the type of group, general topic, subtopic, and specific topic, or alternately, a geographical area and institutional interest. Types of newsgroups include groups dedicated to discussion of computers, science and technology, recreation, arts and leisure, Usenet news, society and social issues, free-wheeling high volume discussions, and a miscellaneous category for topics that fall between the cracks. Discussions cover every imaginable topic from rumors, job postings, inquiries about people on the network (a high-school friend found me this way), discussions about Nepalese culture, Jewish culture, women, men, gay sexuality, anything about computers, political theory, pets of all sorts and so on. Usenet provides something for everyone.

Another approach to providing "something for everyone" via computer network, like Usenet, began in 1979. At the annual New York Computer Fair, the Telecomputing Corporation of America (a subsidiary of Digital Broadcast Company, one of the most heavily capitalized corporations in the history of the United States) unveiled The Source. The Source was the first home-terminal consumer information network put on the market in the United States (Kleiner & Davis, 1979). Often cited as the most ambitiously promoted commercial computer network, The Source was a commercial single node wide area network. It was run on a timesharing computer system in Virginia, and was initially available to its commercial subscribers through a value added carrier on evenings and weekends. Initial costs to users were $2.75 to $4.25 per hour, plus value added carrier charges and an initial sign-up fee of one hundred dollars (Kleiner, 1981).

The Telecomputing Corporation had a difficult time launching The Source. Townsend (1984) identifies several reasons for this. First, the idea of a personal information utility had never been tried with a broad base of subscribers. With only a half million personal computers sold in the United States in 1979, the user base was insufficient to support The Source. Compounding difficulties associated with an uncertain market, in its first year The Source experienced a number of problems. Response time on The Source was slow in comparison to other electronic information systems such as EIES, that was supported in part by the U.S. federal government.

In the fall of 1980, The Source was purchased by The Readers Digest Association. Reader's Digest poured millions of dollars into The Source. Reader's Digest added new features (many of these features had been promised but never delivered), and issued a new user's manual. In 1982 a new computer system capable of supporting two hundred and fifty thousand users was introduced. By 1983, there were forty thousand subscribers to The Source. Access to The Source was available around the clock for twenty to twenty-five dollars an hour during prime time, and seven to fifteen dollars an hour during off-peak hours. Users also paid a monthly ten dollar minimum, and an initial one hundred dollar sign-up fee. In addition, many value added services (such as stock market quotes) were available at additional cost. Subscribers were required to provide a valid credit card number for direct billing (Townsend, 1984).

The Source provided a range of services that fell into four general categories: communications, business, personal, and news. Specific features included electronic mail, electronic conferencing, bulletin boards, computer user groups, newsletters, an electronic equivalent to a CB radio, stock market and commodity news, business commentaries, games, shopping, electronic quizzes and drills, movie, book and restaurant reviews, a database of UPI articles, computer programs (oriented towards business uses), airline information, and several other types of information (Townsend, 1984). All information in The Source's databases was chosen by the company, with some of it paid for by advertising. News services were censored "only because of irresponsibility of editors" (Kleiner & Davis, p. 116, 1979) in terms of four letter words claimed The Source's management, who kept records of how much each piece of information was called up, but not who was calling for what (Kleiner & Davis, 1979).

By 1989, The Source was on the verge of bankruptcy. In July of that year, The Source ceased operation, and transferred its users to CompuServe Information Service, another commercial information utility that had enjoyed a more modest beginning in 1979. CompuServe began as an in-house data processing center and with the availability of timesharing computers moved into the computer service industry, selling time to commercial clients. To facilitate this end goal and to avoid the difficulties associated with depending on another commercial enterprise for the provision of packet switching services, before entering the home information and personal computer market CompuServe had developed its own packet switching network. CompuServe became a publicly held company in 1975. In 1978, commercial electronic mail services were introduced to CompuServe's timesharing clients (Gerber, 1989).

Shortly after The Source began operation in 1979, CompuServe Information Service (CIS) began offering bulletin boards, databases and games targeted to computer hobbyists in twenty-five cities served by the CompuServe packet switching network. Unlike The Source, CompuServe did not allocate much money initially to advertising. CIS used its own packet switching network (this kept users' costs down), and was not dependent upon revenues generated from its personal computer users (Gerber, 1989).

By 1980, CIS was accessible to its four thousand customers twenty-four hours a day. The subscriber base reached ten thousand a year later, perhaps reflecting a marketing arrangement between CIS, Tandy Computer and Radio Shack. Also in 1981, electronic mail became available through CIS, and CIS became available in Canada. In 1983, an on-line mall was introduced. By 1984, CIS had one hundred thousand subscribers, and a year later CIS boasted two hundred and fifty thousand users. In 1987 CompuServe expanded its services to Japan, and by the time it acquired The Source in 1989 it had become the largest commercial computer information service in the world, with a half million users. Services had grown to include one hundred and eighty special interest forums, news, weather, sports and flight information, access to several newspapers and magazines that could be searched for keywords, an electronic version of a CB radio, and a variety of other services.

Like The Source, CIS charges by the hour. However, with its orientation towards hobbyists it entered the market with lower initial and hourly charges. Initially, Canadian users could only gain access to CompuServe through a Canadian packet switching network

(Datapac) that tied into the CIS packet switching network. Users paid an additional eight dollar per hour fee for use of Datapac (Kleiner, 1981).

The extent that the content of information is controlled on CompuServe varies with the type of information. Some services (such as databases of newspaper articles, stock market quotes) that provide a one-way flow of information and can be thought of as similar to other forms of broadcast information appear solely at the discretion of CompuServe management. Information that appears in areas set aside for two-way or forum communications (such as bulletin board areas, public file areas and forum or conference areas) where anyone can be the supplier or consumer of information are moderated by a sysop. Sysops are required to view new messages and files submitted to CompuServe regularly, and pull messages with objectionable content, typically meaning profanity. In addition, sysops are instructed to recycle the message base every two to three days, with new material replacing old. File space associated with each conference or special interest area is limited. This forces sysops to employ criteria to guide the removal of files. These criteria are typically unknown to users (Interview with CIS sysop, 1990).

Although any individual, group of users or organization is free to propose the formation of an on-line forum (computer conference), CompuServe management retains the right to decide whether a proposed forum will appear as part of CIS. Decisions reflect both projected revenues and the extent that the proposed forum is viewed as consistent with CIS' current marketing strategy (S. Wycoff, personal communication, February 9, 1988). When a sysop needs to be replaced, CIS (rather than other sysops in the forum, or the forum's users) determines who will fill that position (Interview with CIS sysop). When CIS agrees to allocate space to a forum, the person or group proposing the forum enters a contractual arrangement with CIS. Usually, a small percentage (such as five percent) of revenue generated by use of a forum is paid to the head sysop of that forum. Sysops are given free access to the forum they help manage (S. Wycoff, personal communication, February 9, 1988).

One response to both the high costs associated with the use of commercial computer networks, and the difficulties some interest groups have experienced in ensuring that commercial computer networks accommodate discussion of their particular issues has been the development of community based computer networks. Community networks (often referred to as Free-Nets) are typically run on volunteer labour and donated computers. They are built on a public library model, which includes the goals of improving access to community and government information.

Any individual or group can use a community network. Although members of each community network determine how their network will be run, typically community groups can place information about their organization on the community network for free. Community members can gain access to community computer networks free of charge from computers placed in public places, such as libraries and women's centers. My local community computer network (the St. John's InfoNet) recently listed 22 community computer networks in Canada, spread over eight provinces.

COMPUTER NETWORKING IN CANADA

As Canadians, we have enjoyed both direct and indirect benefits of U.S. developments in computer networking. And, our

efforts to shape computer networking as Canadians are no doubt constrained by trends in computer networking south of the border as well. Because Canadian and American researchers regularly share scientific information and research results, we have had rapid access to U.S. innovation related to computer networking. Consequently, as Canadians, we have reaped many benefits from U.S. developments in computer networking technology. For example, we had access to Usenet protocols relatively early in their development, and because of our close proximity to the United States, it has been relatively easy for Canadians to gain access to U.S. Usenet nodes, and consequently Usenet newsgroups, which have historically been dominated by Usenet users in the United States. This allowed us to learn about and use the emerging computer networking technology. At the same time, it gave us access to forums for communication dominated by policy makers and communicators in the United States.

Although our close proximity to the United States has made it easy for us to join U.S. initiatives (such as Usenet), the structure of these computer networks (e.g., starting Usenet newsgroups requires voting, and Americans dominate Usenet in numbers) may be ill-suited to using joint resources such as Usenet toward our ends (e.g., discussing Canadian culture on-line).

Canadians have historically used commercial computer networking services in the United States (such as CompuServe and America On-line), despite the fact that using these services from Canada comes at a much higher price than using the same services from within the United States. Ironically, the emergence of commercial computer network providers in Canada has been stimulated in part by changes to the (U.S.) National Science Foundation Acceptable Use Policy (that was adapted by many academic computer networks in Canada) and the decision in the United States to encourage a commercial presence on computer networks (see chapter 4 for a more extensive discussion of these changes). With these recent changes we are likely to see an increase in commercial computer networks in Canada.

The social change sector has been the beneficiary of U.S. developmental efforts in computer networking as well. For example, the development of the Vancouver InFact project benefitted from cross-border friendships that existed between Berkeley based Project One and Community Memory advocates, and the Vancouver based InFact project team. However, this sharing of technology and ideas has not always been without costs. The emergence of PeaceNet, the Web (based in Toronto) and efforts to develop a new social change computer network in Ontario illustrate some of the constraints that can come along with someone else's technology.

Many Canadians began using the U.S. based PeaceNet for computer communications in the 1980s, as no similar resource existed at that time in Canada. PeaceNet staff began noticing an increase in Canadian usage, and offered the use of PeaceNet software to a group in Toronto. The resulting project, which has now been in operation for several years, is called the Web. Although the Web has enjoyed a great deal of success as a computer communications carrier for the Canadian left, at the same time it has experienced competition from other groups who have sought a hand in developing and governing the computer network their group will use (see and Mielniczuk, 1995 and Shade, 1995a and 1995b for a discussion of issues that arose as Ontario social change groups formed a coalition in efforts to develop

a single computer network to meet the needs of numerous groups and constituencies). Because the Web software was initially acquired through PeaceNet (and was initially maintained, to some extent by PeaceNet), the Web did not enjoy the degree of flexibility in terms of altering the software that a truly autonomous information provider might have had.

One area related to the influence of U.S. computer networking on Canadians that is likely to receive more attention in the future has to do with establishing norms for on-line communication that satisfy both Canadian and U.S. cultural norms and laws. A debate that surged in relation to Karla Homolka's plea bargain a few years ago brings this issue to light.

In the United States, juries are often sequestered, and the media often reports the gory details of cases before the courts. In contrast, in Canada juries are infrequently sequestered, and generally, many of the details presented in the courts are not published or broadcast by the media. When Karla Homolka negotiated a plea bargain that limited the terms under which she could be prosecuted for her involvement with Paul Bernardo in murdering two Ontario women, Canadian courts ruled that the details of the plea bargain should remain undisclosed. However, in the United States different norms and rules prevail, and the U.S. press did not feel obliged to satisfy the terms set forth by the Canadian legal system. Details of Homolka's plea bargain were broadcast in the United States. With many Canadians using computer networking resources (such as Usenet) that overstep the U.S.-Canadian border, a debate about whether or not to place information about Homolka's plea bargain on computer networks (accessible to Canadians) emerged. Several Americans in fact did place information that was available through the U.S. media (but banned in Canada) on computer networks where it could be viewed by Canadians. Clearly the U.S. involvement with computer networking will continue to have an impact on Canadian computer networking in the future.

Despite what some might argue has been a dominance of computer networking by American initiatives, as computer networking technology has matured and networking technology has become more widely diffused, so too have Canadian contributions to computer networking technology, as well as efforts to ensure that computer networking resources meet the needs of Canadians. Several Canadian contributions to computer networking oriented towards meeting women's needs are discussed in the next chapter.

ISSUES ARISING FROM THE DEVELOPMENT OF COMPUTER NETWORKING TECHNOLOGY

Although there are several other computer networks in existence today, (including other bulletin board systems, multi-node bulletin board systems, networks that consist of bundled electronic mail distributed through packet switched networks, and non-profit networks oriented towards groups), all have evolved from the technical and social climate outlined above.

Although most literature neglects to address the social and technical climate that supported the growth of computer networking technology, when the circumstances surrounding the early development and use of this technology are considered, several interesting issues emerge that beg further consideration. Issues warranting further consideration include the relationship of the physical structure of computer networks, access to different forms of

communication, the extent that computer networks are accessible in different locations and to a variety of interest groups, and the extent that forms of computer networking today are related to the social goals and circumstances that surrounded the development of networking technology. Finally, now that computer networking technology has progressed past its infancy, how has it matured? Is it growing and changing in ways that were anticipated by its developers? Are there ways that the social circumstances and social goals that informed the development of computer networking technology still influence its use?

Computer networking emerged first from large, heavily capitalized institutions. Early experimentation at the U.S. OEP under the direction of Turoff produced interesting experiments in new forms of structured communication, such as Delphi polling. Although there have been several experiments that investigated new forms of communication via computer, we know little about the processes of communication that occur via computer network outside the business, research, governmental, and educational sectors. Given the available technology, what forms of communication are occurring in the social change sector, and in particular, what form is communication taking between women concerned with feminist social change?

Throughout the development of computer networking, a struggle over control that began with hackers' resistance to the development of the CTSS in the early 1960s has continued. The notion that computer networking technology should be widely accessible was central to the development of the Community Memory Project, INFACT, PcNet, Fidonet and Usenet, and more recent computer networks such as PeaceNet, Solinet and the Web (as opposed to the World Wide Web, which is discussed in chapter 4). To what extent has the desire for a widely accessible, minimally controlled computer networking system been realized? Does the physical structure of a computer network influence accessibility, use and participation? What does this mean for women?

The history of computer networking can be characterized by two opposing goals (the use of technology to enhance control of the populace versus the use of technology to liberate the populace) that informed the development of computer networks. With little written about the social circumstances surrounding the development of networking technology, we have seldom questioned what relationship (if any) present day ideas about and uses of computer networking technology have to the social goals and visions that informed the development of this technology. And, we have little sense of how communicative processes are managed on computer networks designed explicitly to be difficult to manage.

Finally, other than applauding hackers for their contributions, we have largely failed to consider how technophoria (love of technology and obsession with it) has entered into the processes surrounding the design, development and use of computer networks. Chapter three provides a brief historical overview of the use of computer networks by women in the context of women's issues and feminism, Several of the issues outlined above are briefly discussed in chapter three, and are discussed at greater length in part B as well.

CHAPTER 3

COMPUTER NETWORKS (II): AN OVERVIEW OF WOMEN'S NETWORKS

WOMEN'S USE OF COMPUTER NETWORKS: BACKGROUND

As women's exposure to computers has increased, and greater numbers of women and women's groups have gained access to computer equipment and knowledge, women in North America have begun to incorporate computer networks into their visions of the future, and to use them in their organizing efforts. Although both U.S. and Canadian women's groups have begun investigating communication via computer, and several women's computer networks exist, present use of computer networks by women's groups is limited. It is nonetheless useful to consider the reasons that women's groups are exploring the use of this technology.

A RATIONALE FOR USE

The range of services available on computer networks can in theory aid women's organizations in a variety of ways. For example, cost often acts as a constraint in feminist organizing, limiting the size and frequency of mailings, travel, and long distance phone contact with other organizations, and between members of national organizations. Electronic mail (traveling much faster than surface mail) can be used for memos, letters, brief messages and documents. Computer bulletin boards can be used to get time dated information out to large numbers of people who have access to appropriate computer equipment quickly and inexpensively. The use of electronic mail in combination with computer conferencing can reduce both the need for face-to-face meetings and travel costs. Unlike communicating by phone, communicating via computer networks does not require the people communicating to be simultaneously using the communication channel.

In addition to cutting communication costs and decreasing the amount of time required for communication, computer networks potentially offer other advantages related to community organizing. When several different organizations are sharing one computer network, the potential exists easily to share information between organizations. Organizers of PeaceNet, a non-profit global computer network (accessible from seventy countries) dedicated to peace have found that through the use of PeaceNet organizations have become aware of the activities of other organizations (Personal communications with Mark Grahm, PeaceNet staff, March, 1988).

Computer networking can increase alliances between organizations, and greater awareness of other organizations' activities can lead to increased cooperation, and reduce the duplication of organizing efforts between organizations. Computer networks that reach beyond the geographic area normally served by an organization can potentially be used to

increase the size of an organization's constituency, through improved outreach. Computer networks can potentially be used to decentralize decision making in an organization by improving communication with members in areas such as the Canadian North, whose voices are often under-represented in provincial and national women's organizations. However, Rubinyi's (1989) findings from a two year study of seventy-two community based nonprofit organizations in the United States, that began with the groups' initial adoption of computer technology in 1982, identifies geographic inequities in relation to computer networks, and suggests that groups that were more successful in utilizing computer technology were more likely to have a centralized decision making process. Many women's groups do not conform to this model.

Although any organization could potentially benefit from improved communication via computer network, women's organizations (typically under funded and under staffed) are somewhat rare in the magnitude of their need for a less costly and more timely communication system. Women's organizations are also somewhat rare in that they are frequently managed horizontally rather than vertically. Despite Rubinyi's (1989) findings, computer networks continue to appeal to women's organizations as a potential solution for a variety of communication difficulties. Although instances where women's groups have used computer networks are limited, several computer networks designed to meet the needs of individuals communicating about women's issues and feminism exist.

WOMEN'S COMMUNICATION GOES ON-LINE

Like many aspects of women's history, the details surrounding women's early use of computer networks are quite vague.[15] The earliest uses of computer networks in the context of feminism began in the early 1980s, prior to 1983. They were Net.women, a Usenet news group, and the women's section of the Issues Forum on CompuServe.

NET.WOMEN AND THE EVOLUTION OF USENET NEWSGROUPS DEDICATED TO WOMEN'S ISSUES

Discussion of women's issues and feminism on Usenet first occurred in the Net.women newsgroup. Constant dissatisfaction with that group led to the formation of several spin-off newsgroups, including several that are still in existence today. Groups that grew out of Net.women include Net.women.only, Sappho, Talk.abortion, Soc.feminism and Talk.rape. In addition, proposals for other related newsgroups (such as Soc.gender-issues) failed to come to fruition.

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[15]In efforts to obtain information about women's early use of CompuServe Information Service, I posted messages to individuals who either were active in the current discussion of women's issues in the men's and women's issues section on CompuServe, or were known to have been active in the predecessors to this section, the women only section. Messages were posted January through April 1988. In efforts to obtain information about net.women and net.women.only on Usenet, I posted messages to several groups, including soc.women, news.news, news.groups and news.misc and misc.wanted. Requests for information generally resulted in one or two messages, which were often followed up with more specific requests. Virtually all information was vague. For example, "when I started reading the net [in 1983] net.women was already around. My guess is that it started in the real Early Days (Austern, 1990b)."

Net.women began in 1982 or 1983. It was an outgrowth of Net.singles (Gregbo, 1991), a newsgroup for single people (Gilmore & Spafford, 1991). Some discussions pertaining to women and relationships occurred in Net.singles, and a place other than Net.singles was deemed necessary for the discussion of these issues (Gregbo, 1991). Woods (1991a) points out that in those days, with only a few hundred sites on the Usenet network, all that was required to begin a new newsgroup was a little discussion in what was then called Net.news.groups, and someone willing to send a newsgroup. (In contrast, current procedures for starting a newsgroup are outlined by Woods (1991b) in a three page article available through Usenet. Procedures include a call for a discussion, an extended voting period, and posting and verification of vote results. Vote results must fall within specified guidelines to result in the formation of a new group.) Net.women appears to have been somewhat controversial from the start, and remained a confrontational arena of communication throughout its existence.

Net.women was available to all Usenet users. Generally, this meant women and men in universities and scientific/technical institutions in North America. In the days of Net.women (along with all other Usenet groups, Net.women had its name changed in "the 'Great Renaming' in 1986" to Soc.women (Woods, 1991a)), women working in scientific and technical professions were perhaps more isolated than now. Women sought contact with others who shared their circumstances.

"Flaming" has been central to the evolution of Usenet newsgroups dedicated to the discussion of women's issues and feminism. "Flame is the Usenet term for an article that essentially involves an opinion held so strongly and fanatically that its author seems to be shouting rather than communicating" (Anderson, Costales & Henderson, 1987, p. 274,). By 1983, dissatisfaction with the "flaming" in Net.women had led to the formation of a new Usenet newsgroup called Net.women.only. Although only women were supposed to post messages to the Net.women.only newsgroup, access to that group was unrestricted (Woods, 1991a).

Often referred to as the "experiment" (Haviland, 1991; Wood, 1991), Net.women.only was not moderated (the provision for moderated groups had not yet been added to Usenet), and according to Woods' recollections, "the net was eighty-five percent male and there was no way to enforce this restriction, it was a dismal failure" (Woods, 1991a). Austern (1991a) comments that when he began using Usenet in 1983, Net.women.only "was quite moribund," and Travis (1991) in recalling 1984 comments that "Net.women.only was a joke even then, with an extraordinarily high signal-to-noise ratio."

Although Net.women appears to have grown out of general discussions in Net.singles, the demand for Net.women.only seems to indicate that women attempted to create a place for newsgroup participants to express ideas and feelings, and discuss issues of concern to women in a supportive environment. Participants often describe this as creating an electronic women-space, or an electronic sisterhood (Femail transcripts, 1991). Despite repeated attempts to foster such an environment via the Usenet computer network, all attempts at creating such an environment with unrestricted membership on the Usenet network have been characterized by heated debates, widespread antagonism, and a constant search for alternatives.

Despite difficulties associated with unmoderated newsgroups dedicated to the discussion of women's issues on Usenet, several other unmoderated newsgroups formed on Usenet over the years, in addition to moderated newsgroups available through Usenet and other networks. Soc.women still exists (many of the

comments above were solicited through a message submitted to Soc.women). Net.women.only appears to have "lingered on until the Great Renaming" (Austern, 1991a) in 1986. Among the spin-offs of Net.women and Soc.women are Soc.men, Talk.abortion, Soc.feminism, Sappho, Talk.rape and a failed attempt to form a group called Soc.gender-issues (Ockerbloom, 1991). Ockerbloom reflects on the formation of Soc.men, and the attempt to begin Soc.gender-issues:

> there was some tension about the discussion of men's issues and gender-issues from a male viewpoint in soc.women, which prompted a call for the new group [soc.men]. The soc.misc threads [groups of messages] were quite successful, and the new group appeared in late spring or early summer [of 1987]...soc.gender-issues (an attempt in 1988 to separate out general gender-related discussions from issues more specific to men or women; did not get enough votes to be created).[16]

Sappho is an unmoderated bundled mailing list that provides a forum and support group for gay and bisexual women. Membership screening prevents men from "listening in" (Spafford, 1991b). Many women who previously read and participated in Net.women and Net.women.only are active members of Sappho (Usenet transcripts, 1991; Femail transcripts, 1991).

By 1986 use of Usenet had increased tremendously. A number of new newsgroups had formed, and the volume of messages posted to all groups had increased dramatically. The increase in variety of Usenet newsgroups combined with the higher quantity of Usenet messages made it more difficult for network participants to locate information of potential interest, and determine the most appropriate newsgroup or newsgroups for posting messages. In response to these problems, a new newsgroup naming scheme was introduced on Usenet. Among the innovations introduced with the renaming scheme was the talk prefix. The talk prefix is used to identify groups likely to be high volume in terms of both number of articles and heat of debate (Anderson, Costales & Henderson, 1987). Talk.abortion and Talk.rape were created to remove unwanted controversial debates (e.g., about whether or not there is a biological basis for rape) from Soc.women, and to decrease the quantity of material appearing in Soc.women.

Soc.feminism is a moderated newsgroup that began in 1989 (Ockerbloom, 1991). Several Soc.women participants had attempted to discuss feminism in that group, and found that their comments drew a large number of antagonistic messages. Dissatisfied with the confrontation surrounding basic assumptions of feminism that occurred in Soc.women, Soc.feminism grew from a desire to create an on-line environment where feminism was accepted as a starting point. One of the rationales provided for making Soc.feminism a moderated group was that the very existence of moderators would discourage potential participants from investing time in reactionary and hasty responses.

Moderators for Usenet newsgroups are nominated by network participants, and voted into their positions by network participants who choose to follow discussions in the administrative newsgroups. Usually several people act as moderators for a single group. When a message is submitted to a moderated group, one of the moderators receives and views

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[16]All quotes taken from interaction that occurred via computer network, as well as all portions of transcripts of computer network interaction that are reproduced in part B are reproduced exactly, including the repetition of typographical errors. In the interests of readability, the convention of indicating when a grammatical error has occurred in the original has been omitted.

the message and decides whether or not the content of the message is consistent with the group's mandate. If the message is deemed appropriate by the moderator, the message is forwarded to the moderated newsgroup. In the event that a message submitted to a moderated group is deemed inappropriate, the message is not forwarded to the group. If the author of a contentious message feels he or she has been slighted in this process, he or she may resubmit the message to a different moderator after a specified period of time has elapsed. Because each moderator may interpret a group's mandate differently, often a message rejected by one moderator is forwarded to the group by another moderator.

Soc.women and many of the feminist Usenet groups that have since appeared seemed to grow out of conscious attempts to provide a place for participants to express ideas and feelings and discuss issues of concern to women in a supportive environment. Despite the long history of women attempting to use the Usenet network to meet these needs, Usenet newsgroups dedicated to communication about women's issues and feminism continue to be among the most problematic examples of the use of computer networks for communication about women's issues and feminism. The number of repeated attempts to secure Usenet resources to meet these needs raises a number of issues warranting further examination.

Usenet, described as "a voluntary association of people who commit some of their time and computing resources to the free exchange of news" (Henderson, p. 53, 1987) is based on the premise that an open access network with few rules of operation will meet the widest range of needs. However, as Henderson points out, the lack of centralization Usenet is based upon has both strengths and weaknesses. Henderson suggests that the greatest strength is that with the exception of moderated newsgroups, Usenet is uncensored and free of political pressure. One of the issues raised by the use of Usenet for the discussion of women's issues is whether or not open access and lack of centralization are enough to ensure that women's communication needs are adequately met. And, although it is often stressed that participation in Usenet discussions is voluntary, free and unrestricted, an issue that arises as women attempt to use Usenet as well as other computer networks is whether or not network structure acts as a filter in determining group membership.

THE FEMAIL MAILING LIST

One of the more successful and enduring alternatives to Soc.women is the mail-feminist mailing list, which is sometimes referred to as the femail or feminist mailing list. By February of 1984, several women felt that Net.women was not meeting their needs, and were both sufficiently frustrated with Net.women and apparently, sufficiently confident that computer mediated communications could meet some of their needs, that a moderated group was set up to be distributed through network carriers other than Usenet.

The formation of Femail began when an electronic questionnaire, about starting a new feminist computer networking group, was posted on Net.women by a frustrated network user. The questionnaire elicited opinions about whether men should be included, whether the list should be restricted, and whether it should be moderated. Based on questionnaire responses, the new list, mail.feminists began as a public mailing list with the thirty eight electronic questionnaire respondents (eight of whom were men) as participants, along with three others. Some participants on the new mail.feminist list continued to follow the dialogue on Net.women and others stopped; all seemed to share a vision of a place to communicate about women's issues that was

different from Net.women (Femail transcripts, 1991).

In response to a message in the first batch of mail.feminist, asking participants why they sought an alternative to Net.women, many dissatisfactions with Net.women were voiced: it was offensive, chaotic, the discussions were boring and endless, and women's opinions were treated as dumb, stupid, or ignorant by men. One woman had grown tired of debating assumptions she took for granted. Some women sought electronic communication with others that would not be accessible to their bosses and co-workers, as was (and is) the case with all of the Usenet newsgroups (Femail transcripts, 1991).[17]

These comments speak to a need for women to have and control their own communications space, where the circumstances and conditions shared as women can be explored. Despite the difficulties women experienced with Net.women, and other networks since, mail.feminist and other forms of computerized communications have for many served as electronic consciousness raising (CR) groups or support groups, as well as sources of information on feminism.

In moderated bundled electronic mail groups such as mail.feminist, women explore issues in their lives, speaking from their own experiences, along the lines of CR groups of the sixties. Topics of discussion on mail.feminist include what it's like to be raped, explorations of the concepts of marriage, motherhood, discrimination, sexual harassment and sexism, discussions about contraception, sexual orientation and more. Women write about menopause (in one message, the recipe for a high calcium menopause diet was included). In another message a woman recounts the process of deciding to surgically become a male to female transsexual, after living for several years as a transvestite. She encourages other male to female transsexuals on the network to drop her a line, and welcomes questions from others about transsexuals (Femail transcripts, 1991).

Often contributors to the Femail group will describe a dilemma, (I'm not really sure I'm in love with my fiancee..., or, how do I juggle the issues of motherhood and career?) and solicit feedback from other list participants. Women write back with feedback and suggestions concerning the travails of life. Unlike CR groups, these groups allow men, as long as they share the assumptions of the group about women and women's abilities and roles (these are periodically posted), and refrain from flaming (Femail transcripts, 1991).

It is interesting to note that although mail.feminist is not public in the sense that Soc.women is (messages have to clear the moderator to be included in a mailing), there is little control over where the list is distributed. Although the moderator distributes the list only to those people registered as participants in the group, there is no way to control what the registered participants do with the list. Several messages appear in the mail.feminist transcript that indicate that an unregistered person has been reading the bundled mail messages for a few years, and gone unnoticed until they felt compelled to submit a message.

The Femail mailing list is still in existence today. However, some users receive messages sporadically (e.g., every few weeks or months), as pathways between forwarding nodes and the addresses of those nodes change. Some Femail participants receive mail regularly. In the lifetime of the group there have been three or four moderators. Moderators have stepped down when relocation to a new city or new job has resulted in loss of access to the resources required to administer the group. In addition, taking leave from the paid labour force has

[17]The unrestricted readership of Usenet news groups is a social decision, supported by technical design.

resulted in a loss of access to the group for one moderator and several group members. With each new moderator, paths from the central node to group participants must be reconstructed. Each time this has happened, the flow of information between group members has been interrupted.

One of the issues raised through an examination of the Femail mailing list has to do with the extent that the presence of a moderator can minimize conflict on a distributed multi-node network. Interestingly, although the Femail readership is at best slightly more restricted than that of Soc.women, it appears that the mere absence of direct attacks on individuals ensured by a good moderator who rejects nasty messages (or an assumed anonymity related to the media), appears to allow members of the mail.feminist speech community to take risks (that are potentially just as damaging as they would be had messages been posted on Soc.women). Although moderation does appear to affect the membership in on-line speech communities (through a process of overt, rather than covert exclusion), and it appears to contribute to the maintenance of communicative norms at the same time it loosely shapes the content of communication, it does not actually protect group members from the hazards of bundled electronic mail; rather, it may merely insulate and filter message readership and consequently lower the probability of inflammatory or damaging attacks by other network users.

Moderating an on-line discussion will not in and of itself guarantee the success of an on-line discussion group. A recent initiative to set up an on-line discussion group for women in Newfoundland provides insights into some of the potential limitations of moderation. A member of the women's community took the initiative to start an on-line discussion group for the discussion of issues of interest to Newfoundland women. The resulting group, called Nf.women was begun as a moderated group. The group's founder felt that moderating the group would be necessary in order to provide a safe and supportive environment for women. Nf.women was available to anyone with access to Memorial University computer facilities. Because Memorial acts as a conduit for other computer networking services, this included people who had purchased commercial computer accounts from the university, as well as students and teachers in the province's primary and elementary school system.

Initially, there was some resistance to the fact that Nf.women was moderated. The moderator received some messages she felt were inappropriate to post, which left her convinced the group should continue to be moderated. In contrast, some group readers felt that moderation was not necessary. The group remained moderated. Although the moderator attempted to screen and post messages submitted to the group as soon as they came in, at times the moderator was unable to screen and re-post the messages as fast as both message authors and Nf.women readers would have liked. Some message authors became impatient as they waited for their messages to be posted. Perhaps more problematic however was the fact that for some reason all messages that made it through the screening process were re-submitted to Nf.women through the moderator's account, which bore the name of a local women's organization. This probably occurred because the group's moderator was not familiar with the technical aspects of on-line moderation. When the computer services unit (at Memorial University) set up the group for her, they neither provided her with printed information about how to moderate, or what special computer commands were available to assist moderators in doing their tasks (such as screening messages and forwarding them to the group), nor checked to see if she had even a conceptual understanding of how the process worked. Once the group was set up, the moderator was on her

own. Consequently, when readers initially viewed the contents of the on-line discussion, it appeared as though all messages had been submitted to the list by a single, local women's organization. Some message authors didn't like this as their contribution to the list became less visible.

Although there was some discussion about whether the discussion group should be moderated or not, the group remained moderated until the group's founder moved out of town, at which time the list ceased to be moderated. One reader of Nf.women commented that probably very few (if any) of the Nf.women's readers even noticed that the list had ceased being moderated (although when this occurred message authors' names began appearing in the listing of Nf.women messages, where the name of the local women's organization had previously appeared). The initial presence of a moderator may have discouraged would-be antagonists. However, it may also have discouraged some people from contributing to the list (one group reader commenting that the process of moderation deterred him from submitting messages to the group). Finally, slow response time from the moderator in approving messages, and the unusual practice of re-posting those messages from her account may have had a negative impact on the group.

Although leaving access to computerized communications unlimited (as was the case with Soc.women) clearly brings with it its own set of problems (power struggles along gender lines, little control over topics, lack of security etc.), it brings discussions about feminism within 'earshot' of many who otherwise might not contemplate the range of issues debated. For many of the women working in non-traditional areas in academe and industry, bundled electronic mail provides access to other women in similar situations who face similar dilemmas. In a sense, the availability of computer networking technology has stimulated the formation of the group; access to the technology has resulted in an opportunity to communicate. Another issue requiring further examination is the role that moderators play in establishing and maintaining group norms. We know little about the relationship of moderators to the groups they moderate, and even less about the processes the moderator and the group engage in to ensure that participants in a group have access to the types of communication they desire.

THE COMPUSERVE INFORMATION SERVICE

Mailings such as mail.feminist, like other forms of mass communication, only reach and appeal to some people. Primarily available to those with institutional ties, not all who have access to public bundled mail find it useful. Another approach to meeting women's communication needs electronically has been through the allocation of space to discuss women's issues on wide area commercial computer networks. The earliest effort along these lines was the women's section (for women only; it was originally a sub-topic of the National Issues and People Special Interest Group that was later renamed the Issues Forum) available to subscribers of the CompuServe Information Service (CIS).

The women's section on CIS began officially when Pamela Bowen submitted a proposal to CompuServe in late 1982 or early 1983 proposing the formation of a women's forum. Prior to Bowen's proposal to CompuServe, several women who had met through the on-line CB (an on-line version of a CB radio) "were gathering every Saturday night and 'scrambling' for private chats. That was not satisfactory, however, because men kept sending /talk requests and interrupting" (Bowen,

1991a).[18] When Bowen initially submitted the proposal for a women's forum, she was told by CompuServe that there were not enough women on-line to justify it. Bowen commented in 1988 that "they still say that, but I say that's a bunch of baloney because most families have one account, and that account is usually in the husband's name, even if the wife spends much more time on-line, so there's no way CompuServe's demographics can pick that up" (Bowen, 1991a).

Despite CompuServe's refusal to begin a women's forum, they did consult Georgia Griffith, who was (and still is) the head sysop of the Issues Forum. Griffith agreed to have one section of her forum used for women's issues; Bowen became sysop of the women's section and the assistant sysop of the Issues forum. Griffith hoped that if the section was popular enough it could branch into a separate forum. Many CompuServe Forums had in fact followed this pattern of development (Bowen, 1991a).

Once the women's section of the Issue's Forum had been established, many of the women who had been "gathering" on the CB on Saturday nights moved to the new women's section (Bowen, 1991a). In addition to one-to-one electronic mail, one-to-many electronic mail (referred to on CIS as a topic specific bulletin board area, but similar in practice to what other networks call conferences) and document transfer, the women's section featured weekly 'real-time' conferencing, which is similar to a voice conference call where several geographically dispersed participants could communicate simultaneously with a barely noticeable time delay. In addition to discussing issues in the bulletin board area of the women's section, participants during weekly real-time conferences either "chatted" amongst themselves, or talked to an invited guest speaker about a wide range of women's issues. Bowen (1991b) recalls that about twenty women regularly participated in the women's section, and five or six women regularly participated in the weekly conferences.

I remember the women's section as an active discussion area (I "visited" it occasionally in late 1985 and early 1986). It was closed sometime in late 1986 or early 1987 (Casal, 1991a) after a few weeks where participation was low. Casal, who was an assistant sysop of the men's and women's issues section in 1988 (an area originally set up for mixed gender discussions about women's issues that "WAS dominated by men and was eventually renamed the Mens/Womens section" (capitalization in original; Casal, 1991b) recalls that although the women's conferences were regular weekly events for at least three years, in the last few months of the section, she and Griffith "had trouble getting even ONE woman to come...In the end [they] had to open the conferences to men also in order to have a conference at all" (Casal, 1991c).

There were likely many things that contributed to the eventual end of the women only section of CompuServe. Bowen (whose participation ended with her resignation as the assistant sysop of the issues forum (Bowen, 1991a)) speculates that low participation in the women's section was related to the diversity of its participants:

> I think part of the problem is that women who are here are on-line for different reasons. A lot are computer technical people who want to download programs or whatever. Some are like me -- I'm basically very shy, but am a good writer and good typist, and those skills are magnified in this medium. And some just like to hang around CB and chat with all kinds of people (Bowen, 1991a).

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[18] "/Talk" is the name of the CompuServe command that invokes private communication within the CIS CB simulator software.

In addition, both Bowen (1991b) and Van Gelder (1991) indicated that as they spent less time in the women's section, they spent more time elsewhere on CIS. In both cases, increased use outside of the women's section was directly related to professional work.

Van Gelder's (1985) description of the women only section conveys the sense that it was both a busy (widely used) and intimate place. However, previous participants in the women's section mentioned cost as a constraint to women's use, and speculated that the women only section failed to generate levels of profit acceptable to CompuServe. One member of the women's section reported (when it still existed) spending three hundred dollars in one month on CompuServe, without realizing it until the bill came (CompuServe transcripts, 1991). Casal (1991b) raises some important points in relation to gender and the economics of using CIS:

> Cost is certainly a factor. We have had several users who have dropped out because money became tight in their households. A few drop out when they move to areas where there is no node and use would involve long-distance access fees. But I have noticed that, whereas most of the men who have to quit because "money is tight" tend to return after a while, women are more likely to drop out altogether. This is true even when the women were very active participants (Casal, 1991b).

Unfortunately, one can only speculate at this point about the relative importance of the reasons given for lack of participation in the women's section, as the women who were active in that area are in most cases no longer involved with its descendant, the men's and women's issues forum. Upon signing on to CompuServe in the fall of 1990 after an absence, I noticed that the men's and women's section had been renamed "Between the Sexes."

Unlike either Usenet or the Femail mailing list, CompuServe is accessible to the general public. Access to both Usenet and Femail is limited to workers in certain types of workplaces. In contrast, access to CompuServe is tied to one's discretionary income, rather than place of employment. Consequently, CompuServe draws a distinctive audience that we know little about.

CompuServe, like the Femail mailing list, is moderated. However, moderation of these groups occurs in very different contexts. CompuServe moderators have entered into a contractual relationship with CompuServe management, who are responsible for generating profits. In contrast, Femail moderators are accountable to their group and need not concern themselves with the revenues generated by the communication they oversee. One of the issues that arises in an examination of the use of CompuServe for the discussion of women's issues and feminism has to do with the extent that the centralized management of CompuServe and its existence as a profitable business comes to bear on the communication that occurs on that network.

THE WOMEN'S BULLETIN BOARD SYSTEM

The Women's Bulletin Board system (WBBS) was conceived of in 1985, and began operation in 1986. Unlike most computer networking services, the system was proposed and started by nine women from the social change community, rather than the computer bulletin board community. These women discussed the formation of the WBBS via a computer network, and after selecting the hardware and software for the WBBS, spent two months learning their way around the system before publicly announcing it through flyers and mailings to women's groups and contacts in the New York City women's community, in April of 1986. Founders of the WBBS anticipated that

potential users might lack the knowledge to use a computer network with little assistance. In an effort to eliminate this barrier, one of the co-founders of the Women's Bulletin Board system in New York City reports that she has provided extensive support for potential users of that system, including on-line (via computer) help, hard copy (in print on paper) help and in person help (Interview with Angela Leucht, November, 1988). This has no doubt contributed to the success of the Women's Bulletin Board System.

The founders' initial goals were to provide a bulletin board for organizing around women's issues and to share information between women's groups. The bulletin board allows users to send electronic mail to other users, post public messages on a variety of topics of concern to feminists, and upload and download files (document transfer). Unlike most bulletin boards in operation in the mid-1980s (that did not easily accommodate the organization of messages), the Women's Bulletin Board is split into twenty seven posting areas, each set aside for a different set of topics. Consequently, the public messages posted on the Women's Bulletin Board read more like a computer conference than a bulletin board, and users can more quickly locate information of potential interest, and can avoid some topics altogether. Among the existing bulletin areas are areas for action alerts (time dated public notices), discussions about women and AIDS, parenting, recovery from sexual abuse, recovery from alcohol abuse, general women's issues, notices about conferences, as well as areas for teenagers, women of color, and groups that wish to have restricted (rather than public) communication.

Several things distinguish the Women's Bulletin Board from other bulletin boards and computer networking services. The Women's Bulletin Board was begun and is currently run by a group, rather than an individual. This is a dramatic contrast to most bulletin boards that are run by an individual, who often thinks of the board as an extension of their house, or as their kingdom (WBBS transcripts, 1991). In contrast, group management of the system was a major factor in selecting software for the Women's Bulletin Board. Unfortunately, women's groups have not used the WBBS as much as was anticipated. One of the co-founders attributes this to the software that she feels was not designed for, and does not really accommodate group communications. Another co-founder felt the largest obstacle to the board's use by groups is that most women's organizations (in the U.S.) do not have computers, and those that do often do not have modems (Group Interview, November 1988).

The Women's Bulletin Board has avoided many of the problems that have plagued other attempts to provide an electronic women's meeting place. Although women users of other computer networks frequently complain about having their views attacked by men, about having to struggle continuously to keep the 'conversation' focused on women (women on CompuServe once held a real time conference about how to deal with these issues), and report boredom at debating basic assumptions (that men should help change diapers, that day care needs to be more accessible), newcomers to the Women's Bulletin Board frequently comment on the congenial atmosphere that characterizes that system.

One social innovation that may have contributed to the often commented upon atmosphere of the Women's Bulletin Board system was the introduction of a section of the bulletin board called the Battleground. When discussions become debates, the moderator of the area where this transition occurred moves the controversial messages to the Battleground; an area of the WBBS set aside specifically for controversy. This seems to create a safe feeling in the other discussion sections, and at the same time makes participation in controversial

discussions optional, rather than mandatory.

Despite these strengths, founders of the Women's Bulletin Board have at times been discouraged with the changes that have occurred over time. All but three of the board's original moderators and sysops, all of whom came from the social change community, have left. They have been replaced by women who have come from the bulletin board community, and one co-founder feels that these two communities do not often see ideas or process in the same way (Interview with WBBS Co-founder, November, 1988).

In the fall of 1990, the WBBS was temporarily out of operation. The modem used to operate the WBBS had been damaged when lightning struck the building where the WBBS was housed. A few of the sysops had left the WBBS, and founders were seeking new people to replace them. Founders were also looking into the acquisition of new hardware and software to run the WBBS on. Though weary, WBBS founders still felt that the WBBS was a valuable community resource that could contribute to the New York City women's community.

Unlike the other networks discussed so far, the WBBS was developed by lay people who maintained an awareness of the unique needs of non-technical women users throughout the implementation of the WBBS. The WBBS was the only network that was run by a restricted group, and the only network accessible to users outside of their workplaces who had little disposable income. The initial founders of the WBBS were well versed in the politics of women's organizations and community organizing. Perhaps the most notable issue that arises from the study of the WBBS is whether these factors led to a discernible difference in the character of communication that occurred on the WBBS (this is addressed in greater detail in chapter seven).

THE AMAZON LINE

Another approach to providing a computer mediated discussion area for women via a commercial computer network was attempted by two women in Toronto. The service, named the Amazon Line, was scheduled to begin operation late in 1985. As of February 1988, it was still not quite off the ground, though its founders had not given up hope. The Amazon Line, it was hoped, would allow women throughout Canada to quickly exchange information relevant to feminist social change. The Amazon line was to be run on a university computer, that sells computer time and storage space to individuals and groups with no university affiliation. Software was available that would allow public and private electronic mail, as well as time-delayed and real-time computer conferencing. Locating the Amazon Line on a university computer system meant that out of town users could gain access to the system via **value added carriers**.

Founders of the Amazon Line targeted their service (slated to cost an initial sign-up fee around fifty dollars, a monthly minimum between ten and fifteen dollars and a twelve dollar per hour fee ("Computer link", 1985)), towards professional women. When asked what factors they felt had kept the Amazon Line from flourishing, two points came up. First, they found that many of the women they had hoped to attract did not do their own typing, but rather had secretaries who typed for them. They were attempting to introduce computerized communications to a population that did not have a direct need for it. Adoption of their service by the desired population would have required a change to existing working patterns. Secondly, they found that at the time the service was publicized (1985), many women still did not have access to the knowledge required to use it. The Amazon Line's founders anticipated developing an educational strategy to accompany the re-introduction of the service

(Personal Communication with Pat Hacker, February, 1988). However, to date, this has not occurred. In the meantime, women's access to equipment has improved, and many women have gained experience and confidence with computers.

THE CANADIAN RESEARCH INSTITUTE FOR THE ADVANCEMENT OF WOMEN

All of the attempts to create and maintain women's electronic communication space that have been discussed so far have been either oriented towards individuals, or in the case of the Women's Bulletin Board, oriented towards groups in general, rather than a single group and its specific communication needs. The Canadian Research Institute for the Advancement of Women (CRIAW) has engaged in the process of developing a computer networking system to meet that group's needs. CRIAW was among the first woman's organization in North America to actively adopt computer communications in efforts to reduce the communication difficulties associated with a national organization.

Members of the organization (a diverse group of women inside and outside of academia in both English and French speaking Canada) began discussing computer networking early in 1987. Around that time, a few of the women who had access to institutional computers began exchanging messages electronically. In November of 1987, hands-on training was provided for board and committee members. Since that time, the executive and some members of the board have been brought on-line (Assheton-Smith, 1988).

With board members located from the Yukon to the Atlantic provinces, it was hoped that electronic mail would reduce the amount of time required between information exchanges, as well as the expense associated with long distance phone charges. Other somewhat longer term goals for beginning a computer network include facilitating the work of individual groups within the organization and making resources (such as bibliographies) more accessible to members of the organization. From CRIAW's initial discussion of computer networking there was an awareness that the technology lacked standardization and that there would be many problems to overcome. In addition, beginning with the first discussion of computer networking at an executive meeting in 1987 there was an awareness that adoption of networking technology could create a two-tiered organization, with women who lacked access to mainframe computers, who were in rural areas (and lacked access to a value added carrier) and/or working in community groups less able to participate in an on-line communication process. Even though CRIAW was aware that it wanted to build an open communication structure (rather than one that intensified elite processes), the organization did not initially address whether or not there might be differences in access to an electronic communications system based on the preferred language of the speaker (Assheton-Smith, 1988).

A decision was made to first attempt to get CRIAW's executive communicating via computer. Even though access to and familiarity with computers varied a great deal amongst members of the executive, and no real budget for the project existed (repeated attempts were made to secure external funding to launch the project), in Assheton-Smith's words, "as frequently happens in women's work, we had to determine how to make our 'real' situations work, patching together our anarchic realities" (Assheton-Smith, 1988 p. 4). Since several of the executive board members were institutionally based and a few had begun exchanging electronic mail, a decision was made to build on institutional access to equipment, and at the same time secure access

to the system for non-institutionally based executive board members. This meant in some cases providing access to equipment (such as modems) and in other cases securing access for board members to donated university computer accounts. Additional efforts were made to familiarize board members with the intricacies of computer networking technology (Assheton-Smith, 1988). In 1988, I spent a week in the CRIAW office in Ottawa working with the office staff around computer networking.

Between 1987 and 1989 CRIAW confronted many problems related to computer networking. Some of these problems have been solved, and others remain unsolved. Several problems arose in the initial hands-on workshop conducted for CRIAW in 1987. These included an emphasis on IBM compatible computers (several of the board members had Apple Macintosh computers and found it difficult to relate the material presented to their situations), the fact that the workshop was unilingual, and workshop presenters were unfamiliar with computer access in Quebec as well as the availability and intricacies of French-language software. With almost no budget, no capacity to purchase needed equipment and no in-house computing talent CRIAW Board members began communicating via computer. At that time, three women had university access to a mainframe (though each of them accessed their local mainframe through a unique combination of hardware and software), and two potential participants (one in Inuvik and one in Montreal) had access to computers, modems and software, but lacked access to a mainframe computer that would allow them to communicate with anyone else on the Board (Assheton-Smith, 1988). A number of difficulties arose.

The three women with access to university mainframes began communicating relatively quickly, despite problems they encountered related to addressing and computer break downs. When Carleton University offered to donate additional computer accounts to CRIAW (one was already in use by the office staff in Ottawa) a decision was made to use those accounts to provide the non-university women in Inuvik and Montreal with access to other communicators. The Carleton computer was not only difficult to learn and use, but Carleton computing staff also lacked information that CRIAW needed. Finally, the Carleton computer had built-in limitations that made it impossible for CRIAW to easily distribute messages to all potential participants. Although the board member in Inuvik had an account on the Carleton mainframe, there was no datapac node in Inuvik. This meant there was no straight forward way for the woman in Inuvik to access the Carleton computer without spending large amounts of money on either long distance telephone charges or charges incurred from accessing the Carleton computer via a costly commercial network (Assheton-Smith, 1988). CRIAW staff members at times found it difficult to meet their day-to-day work obligations as they struggled to master the new communication system.

With the emergence of the Free-Net in Ottawa, Carleton University (who had been providing CRIAW with access to their computer) transferred CRIAW's account (as well as other community groups) off of the university's computer and onto the Free-Net. Although CRIAW used Ottawa's Free-Net for quite some time, switching to that system was not without problems. For example, Free-Net users (including CRIAW) were limited to one hour of use per day, which at times made it difficult to complete daily communications with board members. In addition, the high demand for access to the Ottawa Free-Net meant that at times the phone lines in to the Free-Net system were busy for hours. During the summer of 1995 a board member visited the CRIAW office and conducted some work on the Free-Net. Frustrated by the limitations of the Free-Net, she suggested to office staff that they investigate

other network providers. A short time later, CRIAW's access to Free-Net ended, without any explanation. When they inquired about getting back on the Free-Net, they were told that due to a backlog in processing subscribers, that they would have to wait for 3 or 4 months before they could get a new Free-Net account. Meanwhile, someone in the CRIAW office knew a woman with a computer account on a service called WorldLink, who found that WorldLink offered reasonable rates and strong customer support. With offices around the corner from CRIAW, a WorldLink representative was able to come to their office and install the appropriate software. They are (so far) happy with the service they have gotten, which includes 24 hour customer support by phone. (Subsequent to writing this paper, WorldLink was bought out by Bell's Sympatico.)

CRIAW's reliance on computer networking as a method of communication has varied over time. During the organization's initial period of adapting computer networking for communication among board members, the board consisted mostly of academic women. Computer networking technology was relatively new, and at that time, familiarity with computer networking technology among academic women was uneven. Over time, as familiarity with computer networking technology increased among academic women on CRIAW's board, a decision was made to increase the involvement of community based women on the organization's board. While many academic women were familiar with networking technology by this time, the technology had not been as widely used in the community. So, as the number of community based women on CRIAW's board increased, so too did problems of access (to computer networks) among community based board members. In order to avoid creating an information elite within the organization's board, the use of fax machines for board communications increased. CRIAW loans fax machines out to the few users who otherwise lacked access to fax machines.

To their credit, CRIAW board members have continued to use computer networking to meet some of their communication needs. For example, the ethics committee 'met' by e-mail to review drafts of documents they were working on, and send changes to the document to those working on it. However, at the same time they have adapted their communication strategies as board members' access to various means of communication (e.g., fax, computer networking) has changed. The early years of experimentation and a lack of availability of funding to further develop the organization's ability to communicate via computer have led CRIAW to revise their expectations over time. Nonetheless, they have continued to consider computer based communication strategies as new technology (such as the World Wide Web, discussed at length in chapter 4) has emerged. CRIAW is beginning to explore how to make the organization more accessible through the World Wide Web.

CRIAW's use of computer networks raises several issues related to access, and brings these complex issues into sharper focus. Perhaps more than any of the computer network implementations discussed so far, CRIAW has attempted to facilitate communication via computer between several distinct (and at times overlapping) groups of people. Among the differences CRIAW has attempted to transcend via computer network are linguistic differences, geographic distances, differential access to resources (e.g., by providing some potential participants with modems and/or access to university based computer networks) and differences in knowledge related to computer networking. Their use of computer networking in an organizational context has hinted at issues related to additional demands being placed on staff members, and the possibility of computer

networking in an organizational context leading to a redistribution of staff responsibilities.

THE AMERICAN ASSOCIATION OF UNIVERSITY WOMEN

Another women's organization that has attempted to meet some of its communication needs via computer is the American Association of University Women (AAUW). AAUW, like CRIAW is a national organization. Unlike CRIAW, membership is only open to women with University degrees. AAUW's interest in computer networks and the social impacts of technology dates back to the early 1980s. Interest in computer networking technology resulted in a hands-on computer networking workshop for members of the Idaho chapter of AAUW in 1986. Although it appeared for a few years that AAUW's interest in computer networking was waning, in December of 1989 AAUW began offering computer networking services through an arrangement with The Source (a large commercial computer network).

Although the AAUW National Office has its own mini-computer that was donated by the Digital Equipment Corporation, in meeting their computer networking needs, they negotiated an agreement with The Source; when The Source was acquired by CompuServe, the agreement was transferred to CompuServe. Perhaps one of the factors that led to AAUW's decision to use The Source was the concern AAUW staff members expressed at having the office swamped with information requests, and the desire to keep their in-house computer system from being overloaded. They had envisioned a computer system that would allow AAUW to drop information onto the network, but would prohibit network users from passing information back to the AAUW office via computer network. As originally conceived, the system was intended for AAUW leaders, who would be trained to use it. If successful, the computer network would be open to the general membership.

The board of AAUW (perhaps because they lacked a general understanding of computer networks) was hardly involved in decisions related to implementation of the computer network. One member recalls that the proposal to use The Source was presented as an either/or issue to the Board. The Board did not discuss the proposal in analytical terms. A member commented that it was just sort of doomed from the beginning. By the time the network was introduced in December of 1989, the notion of developing a core of competent, trained users had been lost. The system was introduced to the entire membership at once. Like the Amazon line, AAUW had failed to provide training or information about what computer networking required in terms of hardware, software, or access. By June of 1990 The Source had been acquired by CompuServe, and only ten people were using CompuServe to communicate with other AAUW members (Personal Communication, Sara Harder, May 1991). By the fall of 1990 any visibility AAUW might have had on CompuServe had vanished. CompuServe management was unaware of AAUW's use of that network, and a keyword search for AAUW users in the CompuServe directory produced no results (personal experience).

Although all of the factors that contributed to the failure of AAUW's efforts are unknown, it is plausible that one of the factors that hampered their efforts was the sale of The Source to CompuServe. It is possible that the initial announcement that AAUW members could communicate via computer encouraged some AAUW members to acquire access to computers and/or the expertise to connect to a computer network. The process of acquiring computer equipment, gaining a sense of how it works and beginning to use it for computer networking often takes an inexperienced user a

year or longer. It may be that by the time some users were ready to connect to The Source, it had vanished. Although anyone who had an account on The Source was given a complimentary account on CompuServe at the time The Source was sold, potential Source users would not have known that AAUW's networking resources had been transferred to CompuServe. AAUW's experiences with computer networking suggest that an issue warranting further consideration is who owns the resources that support a group's on-line communication (this issue is addressed again in parts B and C).

CANADIAN COMPUTER NETWORKING INITIATIVES

Canadian efforts to facilitate women's use of computer networking technology have spanned the recent history of computer networking. Although some early initiatives such as the Amazon line were less than successful, CRIAW's long term interest in and commitment to computer networking has resulted in some of that organizations communication needs being handled via computer network. More recently, several other computer networking projects have emerged to serve a variety of needs.

For example, researchers at McGill University developed a computer program that allows computer network users to more easily find information of interest on-line (see chapter 4 for a discussion of a computer program called Archie). Several other Canadian computer networking initiatives oriented towards women's issues have been developed on **list servers**, which automate the process of sending mail out to large groups of people. List server technology is described below, along with a few Canadian based list servers oriented towards women's issues.

LIST SERVERS: THE BREAST CANCER LIST AND PAR-L

As computer networking has grown, list server technology has developed and has increasingly been adapted by individuals and groups interested in women's issues. List servers are a bit like bundled electronic mail (the Femail mailing list) in that all message are sent to a central location and then resent to individuals, who read the messages via their own computer's electronic mail program. List servers typically run on wide area networks, as well as the **Internet** (see chapter four for a discussion of the Internet). List servers are relatively easy to begin and less expensive to use than a wide area central node computer network (like CompuServe).

Like a bundled e-mail group, use of a list server requires that a person take responsibility for dealing with technical problems, and a location be designated as the host location. People interested in the contents of a list server typically send an electronic mail message (that usually follows a pre-defined format) to an address at the host, requesting to be a subscriber. Once the user has been added to the subscription list, she receives every piece of mail submitted to the list.

List server groups can be unmoderated or moderated. When a list server group is moderated, all submissions to the list are sent to the list server, where they are held until the moderator can screen them. Messages that are deemed by the moderator to be suitable are then sent by the list server to everyone all of the list's subscribers. Typically, if a moderator deems a message unsuitable for a group, he or she sends a reply to the author of the inappropriate message indicating why the message was deemed inappropriate. If a list server discussion group is unmoderated, as messages are submitted tot he list server, they are sent out to all of everyone that subscribes to the list.

Two feminist list servers based in Canada are the breast cancer list (an un-moderated list server run on a computer at Memorial University), and the PAR-L list (which stands for policy, action and research), which is run on a computer at the University of New Brunswick, and is moderated by two women.

The Breast Cancer List was started by Jon Church, a cancer researcher at the Terry Fox cancer research center, housed at Memorial University. Church was asked to sit on a committee that was addressing issues related to breast cancer. He soon became aware of the politics of breast cancer, and decided to do something (other than basic scientific research) to assist women with breast cancer. The result was the Breast Cancer List, which has grown to be a very popular unmoderated mailing list (it receives between 30-50 messages a day). Based on message content and message volume, it appears that the Breast Cancer list serves a real need for both those living with breast cancer, and friends and family members of women with breast cancer. An archive of the breast cancer list is also maintained, so anyone interested can review the contents of the group's earlier discussions.

PAR-L is a bilingual moderated list for exchanging information about policy, action and research (hence the derivation of the name of the list) on women's issues. It was begun by the Canadian Advisory Council on the Status of Women (CACSW) shortly before its demise, in the spring of 1995. Prior to the announcement of the 1995 federal budget in Canada it was widely rumored that CACSW might be eliminated when the budget was announced (it was eliminated two weeks after the 1995 federal budget announcement). For 25 years CACSW played an important role for Canadian women by translating academic research into accessible language, bringing together research on similar topics conducted in different regions of the country, and evaluating proposed policy and voicing concern about its anticipated impact on women.

Concerned about the long term consequences of the elimination of CACSW, with the cooperation of others at CACSW, Wendy Robbins (an academic who was on leave from her job at the University of New Brunswick in order to work as a researcher at CACSW) organized a cross-country conference call to discuss setting up a policy oriented discussion group on a computer network. It was hoped that the creation of an on-line discussion group dedicated to policy, action and research would help fill the void that would result from the elimination of CACSW. Working against time, with the assistance of numerous women throughout Canada, PAR-L became a reality on March 8, 1995. Once PAR-L was operational and the rumour that CACSW would be eliminated became reality, Robbins asked the University of New Brunswick to host the PAR-L list server.

PAR-L is currently co-moderated by Wendy Robbins at the University of New Brunswick, and Michele Ollivier, at the University of Ottawa. People interested in subscribing to PAR-L send a subscription request by electronic mail to the list server (see the appendix for further information). The list server sends back a series of messages acknowledging the subscription request, welcoming new subscribers, and providing an overview of the goals of PAR-L. In addition to exchanging information about policy, action and research on issues of concern to women in Canada, PAR-L is a tool "for developing, conducting, and distributing women-centred research in a multidisciplinary context" (Usage guidelines for PAR-L, p.1). It is hoped that PAR-L will help support feminist researchers in Canada. PAR-L accepts contributions in both official languages.

A common complaint about list servers revolves round the volume of mail they

generate. For example, it is not uncommon for fifty new messages to be posted daily to the breast cancer list. Practically speaking this means that if you are a subscriber to that list, each day you may have between thirty and fifty new messages in your mailbox. Even if you don't have time to read them all, you probably would want to delete them. If you are paying by the minute for your computer account and/or paying for the volume of space you use on a commercial computer system, you may find a list server irritating. To solve this problem, the contents of some list servers (including PAR-L) are provided in digest form, which simply means that the messages may be stripped of headers (and in some cases edited to eliminate redundancy) and combined into a single message. Among the benefits of list server digests are that users get the contents of a list server in an easier to handle format. The down side to list server digests is creating and maintaining them requires more labour than regular list servers.

A number of other list servers catering to women's issues are run on computers in Canada. These include Austen-L (dedicated to the discussion of the work of the British novelist Jane Austen and her contemporaries), hosted by a computer at McGill University; CCWEST (oriented towards women and girls in science and technology in Canada), which is hosted at Carleton University, and NURSENET, hosted at the University of Toronto. NURSENET focuses on nursing research, practice, education and administration. Although all of these resources are hosted on computers in Canada, readers may be located anywhere with computer access, and contributions are not restricted to Canadian content on unmoderated list servers.

CONCLUSION

Many other instances of the use of computer networks in the context of feminism exist. Since work on this book began, several other networks have begun to offer women's services and a few bulletin boards have catered to a feminist audience (such as the Jane Addams Bulletin Board in Chicago, and the FidoNet feminist echo-mail conference). During the period of the study the Canadian Union of Public Employees (CUPE) began a computer network called SoliNet. SoliNet (available on a fee for service basis to other unions and individuals) has a women's section that operates on an invitational basis. In addition, regional and national women's groups in Canada are beginning to consider computer networking as an alternative to conventional modes of communication. Among the groups who have held workshops for their general membership about adapting computer networking technology are CRIAW/Newfoundland, the B.C./Yukon Association of Women's Centres, and Women in Trades and Technology. Some board members of the National Action Committee on the Status of Women are currently communicating electronically via a computer located in Toronto. In addition, members of other groups such as the Vancouver Status of Women and Edmonton Status of Women have begun to discuss the use of computer networks in those organizations. The Canadian Women's Studies Association investigated creating a computer network to facilitate communication between women's studies programs in Canada. A Canadian commercial network provider (the Web) began a service called WomensWeb (see chapter 4). Clearly, interest in using computer networking technology is high amongst feminist organizations.

The adoption of computer networking technology by women in the context of feminism has been varied. In some cases, such as Net.women and the women's section on CompuServe, access to computer networking technology allowed women who had not previously met to discuss their feminist concerns with a wider, and in some cases more diverse, audience (see Bowen, 1991b and Van

Gelder, 1991). In other cases (the Femail mailing list, Soc.feminism), having determined that computer networking could accommodate debate about feminist issues, women acting as individuals have attempted to establish the circumstances that will allow them to explore similarities and differences women experience as a group. Efforts have been made to enhance the information flow to local women's communities (the WBBS) as well as nationwide (the Amazon Line). Finally, women's organizations (CRIAW and AAUW) have attempted to use computer networking technology to enhance inter-organizational communication, and can see the potential of employing this technology to enhance communication amongst members of the organization.

In recounting a partial history of the use of computer networks by women in the context of feminist change, several issues emerge. First, computer network structure in a general sense helps define the nature of interaction that can take place between communicators. Second, access to networking technology does not ensure that an environment suitable to the exploration of feminist issues will exist. Third, the existence of a computer network does not ensure that it will be used; women's lack of familiarity with the technology involved constrains its adoption by women. Computer networks can place new demands on workers in organizations that have adopted networking technology. Finally, geographic, economic and linguistic differences can reinforce, rather than diminish, power inequities when this technology is used in an organizational setting. Although these issues have been addressed previously by feminists and researchers investigating issues related to women and technological change, we still know little about how these issues play themselves out in an environment of computer-mediated communication, and even less about how to bring these issues to resolution.

CHAPTER 4

THE EMERGENCE OF THE INTERNET AND THE WORLD WIDE WEB

INTRODUCTION

The computer networks discussed so far shared two characteristics. First, they handled text well, but had very limited capabilities in terms of graphics. Second, when I began studying computer networks in the mid-1980s, for the most part each network functioned autonomously: if you wanted to exchange electronic mail with someone, you had to have a computer account on the same network as the intended recipient. Although there were some exceptions, until the early 1990s most computer networks functioned as stand alone networks. Each was self contained, and there was limited contact between the networks, which usually took the form of electronic mail exchanges. Networks had 'bridges' or 'gateways' to other networks that allowed the exchange of electronic mail and even files, but these features were generally not used by your average (non-techno-nerd) computer network user.

Two developments in the early 1990s contributed to significant changes in computer networking. These changes -- the development of a computer program that searches 'public' areas of computers available on computer networks (called **gopher**), and a computer program that added a graphical user interface (the way Macintosh computers and the Windows program work) to computer networking and combined it with **hypertext**), (called the **World Wide Web**) -- have, in the minds of some, brought computer networking to the masses.

In this chapter I provide an overview of some of the technical developments that have occurred in the last few years, and the changes to computer networking that have occurred as a result. In particular, I cover the Internet, some of the developments that have made it possible to find information on the Internet, and the World Wide Web -- the Internet with pictures. An example of a Wold Wide Web page is presented in Appendix 2.

BACKGROUND: THE INTERNET

Up until relatively recently, computer networks functioned autonomously. This meant that users of one network (e.g., the Women's Bulletin Board System) could not send messages to users of another network, such as the CompuServe Information Service. Over time, computer networks that were functioning autonomously have increasingly begun to communicate with one another, and share information (including electronic mail messages and files) between networks. The resulting 'network of networks' is usually referred to as the Internet, or just 'the net.' Simply put, the Internet is a bunch of computer networks hooked together or connected. The Internet is a

peer-to-peer network, which means that every computer on it is (in principle) equal, and that any computer on the network can connect to any other computer (Levine & Levine-Young, 1994).

Marine (1994) provides a somewhat more technical description of networks and the Internet. For Marine a network is "any set of computers (which are often referred to as hosts) that are connected in such a way that each of them can interoperate with the others" (p.144), and the Internet is "a collection of packet-switching networks that interconnect to function logically as a single, large, virtual network" (p. 147). Networks that are connected to form the Internet can be of many different forms (e.g., wide area networks, multi-node networks such as Usenet, community bulletin board systems etc.). However, in order to be part of the Internet, a computer network must use a packet switching protocol (a set of rules that governs how files are moved from one computer to another) called TCP/IP (which stands for Transmission Control Protocol/ Internet Protocol).

In order to understand how the Internet works a minimal knowledge of a few concepts is useful. The first of these concepts is client-server computing. Client-server computing refers to the following situation. One computer (the server) has something (an article contained in a computer file) that another computer wants. The computer that wants the file containing the article is called the client. The two computers are connected through some sort of network. The client computer sends a request to the server computer and the server sends back a response. The process repeats until either the client gets what it wants, or until the client computer stops trying. The concept of client-server computing is relatively simple. However, the way it all happens is a little more complicated, and involves several different sets of rules (protocols).

Levine and Levine-Young (1994) have suggested that there are four levels of Internet communication. On the applications level, two useful programs talk to one another (for example, a file transfer program on your computer talks to a file transfer program on a community bulletin board system). On the transport level, a protocol makes sure that everything that the applications said would be sent and received is sent and received. This is the purpose of the transfer control protocol (TCP). Next, on the Internet level, computers send packets back and forth. At this point, the Internet protocol (IP) rules are followed to ensure that all of the packets reach their destination. Finally, at the link level data is transferred between two computers physically located on the same network (e.g., two computers across campus from one another). The flow of information starts at the highest level on the sending computer (applications) and percolates down to the lowest level on the sending computer and across the network to the receiving computer, and then percolates back up to the highest level on the receiving computer (Levine and Levine-Young, 1994).

It should not be surprising in light of the extensive military and United States government involvement with the early development of computer networking technology that these agencies figured prominently in decisions that influenced the development of computer networking, and especially the development of the Internet. For example, the development of TCP, which became part of the set of rules followed in Internet computer networking, was funded by the U.S. military. After ARPAnet had been in existence for a while it became clear that the protocol that was used by ARPAnet would not be able to support the number of host computers on that network. This problem was addressed by the Defense Advanced Research Projects Agency (DARPA), who funded the development of a more general set of protocols

than those originally in use by ARPAnet. These protocols, which became the TCP/IP protocol, were developed in 1978-1979, and first implemented in 1980. Beginning in January of 1983, DARPA required that all computers connected to ARPAnet use TCP/IP. Later that year ARPAnet was split into two networks. One network handled classified military documents, and the other network handled non-classified documents. Both networks became a subset of the (U.S.) Defense Data Network, which is made up of several U.S. Department of Defense computer networks that are managed by the Defense Information Systems Agency (DISA), which used to be called the Defense Communications Agency (Marine, 1994).

The U.S. National Science Foundation (NSF) also played a role in the expansion of computer networking in general and the Internet in particular. In 1985 the NSF began a program to establish network access through its six supercomputer centres, which included the National Center for Supercomputing Applications, in Illinois. A few years later, in 1988 plans to phase out ARPAnet began. In June, 1990 ARPAnet was officially dissolved, and most academic sites (in the U.S.) that had previously been a part of ARPAnet were transferred to the National Science Foundation computer network, the NSFnet (Marine, 1994).

TELNET, FTP AND GOPHER

In the 1980s and early 1990s, computer networks were used mostly for electronic mail and uploading and downloading files primarily by the most technically sophisticated computer users. As the Internet emerged and there was a general convergence of computer networks, with many networks connected to other networks through high speed links, a few programs were designed to work in conjunction with the TCP/IP protocol. However, these computer programs were often difficult to use. Nonetheless, during this time the more technically inclined (and patient) computer network users had access to a few other computer communication tools (designed to work in conjunction with TCP/IP) that increased the scope of material available via computer network. Notable amongst these tools were two programs called **Telnet** and **FTP** (for file transfer protocol). Telnet allows users to initiate a connection from one host computer to another, and sign onto and use the second computer as if the first computer was invisible. One might use this capability to do something like check the card catalogue at another university's computer (if the card catalogue at that university is publicly accessible).

Despite what Telnet had to offer, on its own it was limited. FTP (which is both a set of rules governing the transfer of information between computers, and a program) ensures a common standard for moving files from one computer to another (the protocol part) and accomplishes file transfer (the program part). It allows a user to copy files from one far away host (computer) to another. One common version of the program called Anonymous FTP allows users to get files from another computer or put files on another computer even if they don't have an account on the host computer they want to put files on or copy files from. Practically speaking, this means that anyone who knows what they are doing can gain access to numerous public computer files on far away computers. Although a great idea, FTP and Telnet were perhaps under used because they were both difficult to use and pointless to use in the absence of knowing where information of interest was located. Fortunately for those of us who don't like to spend all of our time with our noses in computer manuals, some folks in the Computer and Information Services department at the University of Minnesota took note of these limitations and developed a program called Gopher to help Internet users find and obtain information on the Internet.

Gopher was developed in April of 1991 to help computer network users at the University of Minnesota find information on-line, and to help staff there organize publicly available files and make them accessible to the campus community. It was not originally intended for use outside of the University of Minnesota. Gopher provides an easy way for computer network users to find publicly available information on the Internet, and for information providers to present, organize and distribute a range of services. Unlike previous programs such as FTP and Telnet (that required users to know where the information they were seeking was located, and were difficult to use), Gopher searches through public areas of the Internet and presents an ordered list of resources to the user in an easy to use format (a hierarchically ordered menu). In essence, Gopher built on the concepts of Telnet and FTP and brought the search and retrieval features they offer to a less technically inclined audience.

Although using Gopher represented a huge improvement over FTP and Telnet in terms of finding information on the Internet, others saw a need to develop additional computer programs for searching the extensive holdings of public file areas of the Internet. For example, researchers at McGill University developed a program called **Archie** (named after the cartoon character). Like the inventors of Gopher, they recognized that there was a great deal of information available on computers that had public FTP file areas, but it was difficult to find out what the information was and where it was. Archie was designed in response to these problems. It is a searching program that locates files at anonymous (public) FTP archives (storage areas). It regularly polls these sites and compiles a database of references to available files. The database is available for users to search, which provides a point of access to files on the Internet. Performing an Archie search produces a list of files that match user specified search criteria, and an indication of where they are located. Along similar lines, a program called **Veronica** (named after Archie's friend Veronica in the Archie comic strip) searches through all of the Gopher menus in the world for user specified terms. WAIS, which stands for **Wide Area Information Server**, searches for words in documents that are on the Internet, and retrieves those documents if the user requests them. WAIS began as an experimental joint venture between four companies: Dow Jones, the Thinking Machines Corporation, Apple Computer, and KMPG Peat Marwick. It was designed to retrieve full documents from various sources, either locally or through other networks.

THE WORLD WIDE WEB

BACKGROUND

At around the same time that Gopher was enjoying its debut and gaining popularity, several other events were taking place that contributed to the shape of contemporary computer networking. Significant events included the development of what has come to be called the World Wide Web, and the passage of the (U.S.) High Speed Computing Act and subsequent formation of the (U.S.) National Research and Education Network, in 1991, which introduced changes in policies governing the use of publicly funded computer networks.

Work on the World Wide Web began in 1989. In March of that year Tim Berners-Lee of the European Particle Physics Laboratory in Geneva (known as CERN) "circulated a proposal to develop 'a hypertext system' for the purpose of enabling efficient and easy information-sharing among geographically separated teams of researchers in the High Energy Physics community" (December and Randall, 1994, p. 45). Hypertext was introduced in the 1970s by Ted Nelson, who has been

referred to as both flaky and visionary. The idea behind hypertext is quite simple. A hypertext document provides links to other documents. Selecting a link in one document takes the user to another document (December and Randall, 1994). For example, a map of Canada might have hypertext links to provincial maps, indicted by underlined names of cities and towns on the Canada map. Clicking a computer mouse on an underlined city or town name would call up the city or town map and present it on the user's computer screen. In practical terms, the World Wide Web (WWW) allows a computer network user to view documents (graphical, textual or multi-media, including sound, animation etc.) located on computers throughout the world with a great deal of ease. Similar to the original computer networks conceived of in the 1960s, the idea behind the WEB was to allow collaborative researchers to present their research, complete with text, graphics, illustrations, sound, video and other means (December and Randall, 1994).

Berners-Lee didn't get much of a response when he originally presented his proposal. So, over a year later (in October of 1990) he presented the proposal again. Two months later the World Wide Web (WWW) project began to take shape. Work began on the first **browser** (a program that allows users to move around on the Internet and view hypertext and graphic documents), and by the end of 1990 its development was well underway, and the major principles of hypertext access and reading of different document types had already been implemented. In March of 1991, two years after the presentation of the original proposal, a 'web browser' was implemented on a limited basis at CERN. Two months later (May 1991) the WWW was made more accessible at CERN, and the WWW was effectively launched. In October, 1991 CERN announced the Web to the high energy physics community (December and Randall, 1994).

During 1992 development work on the WWW continued. It included making the WWW browser available via the FTP program (so a wider audience could try it), and conducting workshops about the WWW for a wider community. By January, 1993 50 Web servers (computers set up to handle requests from users generated by Web browsers) were in existence, and a new browser (named Viola) was made available. Viola incorporated many features that had been outlined in the original proposal for the WWW, and in essence offered the first real glimpse of the graphical, mouse based hypertext system that had been outlined. At the beginning of 1993, CERN developed a browser for the Macintosh, and Mark Andreesen of the U.S. National Center for Supercomputing Applications (NCSA) (one of the organizations that was involved in the promotion of high speed computer networking in the U.S.) developed a browser called x Mosaic that increased the accessibility of the WWW to Internet users.

Like Gopher, one of the primary tasks of the WWW is to hide users from the difficulties associated with Internet programs such as FTP and Telnet. Gopher however is limited by restrictions of its display. It presents what looks like a table of contents that allows users to easily view and download files (see p. 77 for a graphic view of a gopher screen). The main difference between the WWW and Gopher is that Gopher doesn't allow or make use of hypertext. Where WWW browsers present information with hypertext links (see p.77 for a graphic view of a WWW screen), Gopher most commonly presents numbered lists of information. Simply put, hypertext allows documents to be linked contextually, rather than simply hierarchically. The difference is akin to the difference between trying to solve a computer problem by first looking in the table of contents of a computer manual, then going to the chapter with an appropriate heading (which you located through the table of contents). This

is sort of how gopher works. In contrast, anyone who has ever used a help system in a Windows computer program has used hypertext. You click a computer mouse on Help (e.g., in a word processing program), and it then displays several options (e.g., questions about the keyboard, questions about menus, questions about printing). Using a mouse to click on one option takes the user directly to the relevant information. In theory, irrelevant information is bypassed. Web browsers are designed to let users follow whatever path they choose in looking at linked information (rather than a single path dictated by hierarchically ordered programs).

The development of a graphic interface for the Internet was not significant only in terms of its ease of use. It has also proved significant in terms of the use of the Internet by business communities. Prior to 1991, most non-commercial computer networks (such as university computer networks) were governed by an **acceptable use policy** developed by the U.S. National Science Foundation (NSF). The NSF acceptable use policy prohibited commercial use of the Internet, and this became the norm for many computer networks throughout the world. In 1991 however, the U.S. High Performance Computing Act established the basis for the National Research and Education Network (NREN), in the United States. NREN was given a mandate to establish and maintain a high speed, high capacity research and education network, while helping to establish a commercial presence on the Internet. The NSF acceptable use policy changed somewhat, but perhaps more significant, the growth of the Internet has been accompanied by the development of new forms and policies, which have included commercial interests (December and Randall, 1994). The ability to display material graphically via computer network, which the WWW accommodates has undoubtedly been a boon to businesses, that are now able to display products for sale, as well as provide access to features such as product support more easily than a text-only interface with the Internet would have allowed.

THE INNER-WORKINGS OF THE WWW

Like the computer networks that preceded it, the WWW requires that the user have access to a computer, modem and a special type of communications program (a web browser, also known as client software). A web browser may or may not include a dialer (that initiates the call to a host computer that is part of the WWW). If the web browser does not have a dialer, the user must acquire one of those as well. The user must also have a special type of computer account, called a **SLIP** account (this stands for serial line Internet protocol-- one of the sets of rules that governs the movement of information on the Internet). The user installs the SLIP software (which requires entering all sorts of information provided by the Internet service provider) on her computer. (The WWW requires users to have a fairly decent computer, rather than a simple 'dumb' terminal that can be used to gain access to text-based systems). Next the dialer is used to make a call to the SLIP provider (also known as a server; in my case, my employer, Memorial University of Newfoundland is my SLIP provider). The user enters a user id and a password. Once connected, the Web browser must be activated, and if all goes well, the provider's **home page** is displayed on the screen (a home page is a computer screen with hypertext links, and usually, some sort of picture or simple graphic). From that point, the user is able to either use her computer mouse to click on a hypertext link on her provider's home page, or enter something called a URL (for uniform resource locator) which tells the web browser where to look for the desired information.

It all sounds pretty straightforward, and,

in an ideal world, it is. In reality, it goes something like this. Step one. I applied for a SLIP account on my local provider. I waited a month due to a back log related to the high demand for access to the WWW. Step two. I went out and bought a new modem, because the WWW does not work on modems that are slower than 14,400 baud. I installed the new modem. Step three. I acquired a web browser. I tried several strategies here. First I found the information I needed to acquire a web browser via FTP. I transferred the required file (which, due to its size, took several hours) to my computer, and attempted to install it. Something was wrong with the program (probably an error had occurred during downloading) and it didn't install, so, being quite pig headed, I tried downloading it again. After several hours the download was complete, and I tried installing it. It didn't work.

Meanwhile I had heard that my university had its own web browser available via FTP. So, I downloaded that (again, several hours went by), and tried to install it. It didn't work. Then I went to my local bookstore and invested $12.95 in purchasing the disks that contained the programs I had been trying to install. Home again, I tried installing the software. This time my efforts failed because installing the program required information from my service provider, and my service provider and the authors of the program used different terminology. The result was that I lacked all the information I needed to complete the installation. By now the weekend was over, and my university's computing services center was open again. I managed to talk my way in to see the person responsible for maintaining the copy of the university's web browser, available through FTP. I told him the program didn't work, and he grunted an acknowledgment of this fact, and grudgingly offered to loan me the master disks for the program. It is now day four. With the master disks for the WWW browser provided by my university, I installed the program. However, I hit the return key at the wrong time during the installation process, which meant that nothing was entered where the phone number of the university computer should have been. As a consequence, the dialer cannot perform its task. On day five I went back to computing services and found out how to deal with the missing phone number in the dialer. Finally, late on day five I successfully gained access to the WWW.

After I found myself lost in computer hell trying to get onto the WWW I began asking people who were raving about the Web how they had gained access to it, and whether or not they had done the installation of the Web browser they used. As it turned out, virtually everyone in my informal little poll either used computers that were already set up for the Web (e.g., in a university computer lab), or had someone else install their Web browser and related software. One friend had switched from one service provider to a second much more expensive provider because the first provider's web browser didn't install properly (the second provider's browser worked as it should have the first time). Using the WWW reminds me a lot of using computer networks during the early and mid 1980s-- from talking to sales people in computer stores, you would think getting on-line required only a few easy to follow instructions. The reality of getting on-line-- even when you had some grasp of what you were doing-- was vastly different.

To get onto the WWW, the first thing you need is an adequate computer. If you are using an IBM or compatible computer, in order to gain access to the WWW you need a computer that runs Windows (typically a 486 with at least 4 megabytes of memory), has enough hard drive space to install your Web browser, and has at least a 14,400 baud modem. A shrewd shopper can purchase a 14,400 modem for around eighty dollars before taxes. Faster modems (the next fastest speed is 28,800)

generally cost around three hundred dollars, though prices are falling). Apple Macintosh users need a computer that runs System 7.01 or a later version of System, and at least 8 megabytes of memory. The Web may be easier to use (once your software is installed) but it definitely costs more to gain access to the WWW than it costs to gain access to text-only computer networks, such as Usenet.[19]

Once you have a computer that meets the minimum requirements for using the WWW, a fast enough modem, a Web browser and dialer, you need access to an **Internet provider**. There is enormous variation in terms of the services offered by both commercial and non-profit computer networks these days. Internet providers fall into two general categories: **shell providers** and **SLIP providers**. Shell providers typically give users access to text based computer applications, such as electronic mail, newsgroups and list servers, and gopher and related programs. Users call into the shell provider's computer, and issue commands to the provider's computer from their own computer, which functions like a terminal. Shell connections are sometimes referred to as indirect connections to the Internet. If your intention is to explore the WWW, you will either require a SLIP connection so you can run a WEB browser and view graphics, or access to a shell provider that uses Lynx (a WEB browser that allows users to view text, but no graphics). You will need to make sure that the Internet provider you choose is either a SLIP provider, or uses Lynx through shell access. SLIP connections are sometimes referred to as direct connections to the Internet, because they allow users' computers to function as servers in a client-server computing environment. Although it is possible to have a direct connection to a service provider without a SLIP connection (for example, to set up a Gopher server), the prevailing assumption these days seems to be that one would only want a direct connection to the Internet in order to run graphically based client-server software that is compatible with the WWW. To be safe, I recommend using the terms SLIP and shell when requesting information from providers, rather than the term direct and indirect connection, which are often used improperly. Just to complicate things, some Internet providers grant access to both shell and SLIP service (though this may be through two separate computer accounts), so you will need to first figure out what types of things you'd like to do, and then determine which type(s) of services you will require.

Most commercial services charge an initial sign-up fee, a monthly minimum that gives you several hours of 'free' use, and a per hour use fee, pro-rated by the minute. Bills can mount up quickly. Some non-profit systems (especially Free-Nets and related services) allow access to the WWW as well. Many community information providers allow free access to the WWW, but restrict the number of hours a person can use the system per day, so that a few people don't tie up all the phone lines into the free systems and prohibit others from using these community resources. Many libraries are now providing computers through which one can access the WWW, though depending upon the library, a potential user may still need an account on an Internet provider, such as a community information provider, in order to gain access to the WWW. Services vary a great deal. Talking to friends about their service provider is a good place to begin the process of selecting a service provider.

Equipped with all the required computer hardware and software and a SLIP account with an Internet service provider, you can finally explore the World Wide Web. Once you have successfully connected through your SLIP

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[19] There are a few Web browsers (such as one called Lynx) that can be run on IBM compatible computers that do not run Windows.

account and begun to run your WWW browser, your service provider's home page will appear. Typically a home page has a graphic of some sort (such as a business logo), a greeting message, and a few hypertext links, that may be simple text, or a graphic indicative of the information a user will find by placing a mouse pointer on the graphic and clicking. From your provider's home page, you can follow hypertext links to other home pages, by clicking on one hypertext link, which will lead you to others. Or you can supply a **URL** (which stands for uniform resource locator) which directs your information provider's computer to initiate a call to yet another computer (for example in Norway) and retrieve the file specified in the URL (e.g., the University of Bergen's home page, which includes hypertext links to a directory of electronic mail addresses of Bergen's faculty members). When you use a URL, you are essentially saying 'connect to a remote server' (the computer that has the file you need).

The point of URLs is to have a simple and consistent way to name Internet resources. URLs are similar to electronic mail addresses, in that they contain the location of the file you seek, which essentially gives your computer enough information to find it. URLs (which must be type exactly as they appear) include information about the type of resource (for example a Gopher file or WWW file), the name of the computer the file is stored on, (the host name or domain name) and where on the computer the file is located (the path name). For example, the URL for the Newfoundland and Labrador Provincial Advisory Council on the Status of Women's home page is
http://www.nlnet.nf.ca/commercial/pacsw/pacsw.html.

The first part of a URL (http://) indicates how the file will be transferred between machines. **Http** stands for hyper-text transfer protocol, which is simply the name of the set of rules that is followed when **HTML** files are transferred between computers. HTML stands for hyper-text markup language, which is the standard file type that WWW files are in. HTML is actually a computer language. So, to create a home page, you have to take a document (such as a word processor file) and convert it into the hypertext marup language. Recently a variety of computer utilities (such as the Internet Assistant that comes with Windows '95) have begun to appear that convert standard word processor files into HTML files, which can then be placed on the WWW, for anyone with WWW access to view. Several other types of transfer formats exist, including those for Gopher files, news files and FTP files. When these occur, they precede the colon and double slashes, just as HTTP does, above.

The hypertext transfer protocol performs a four part transaction. It connects with another computer, request information (e.g., a document) from that computer, waits for a response, and closes the connection. During the connection phase, the Web browser (sometimes referred to as a Web client) attempts to connect to the server, or remote computer where the information you are seeking is stored. Next, the request part begins. The client sends a request to the server (remote computer) that contains some information about what version of the protocol is being used, and the client software tells the server software what it is looking for and how it wants the server to respond (e.g., with the HTTP or FTP transfer protocol). If the server can execute the request, it does, which constitutes the response phase of the transaction. Once the transfer is complete, the connection is closed, and the browser software takes over by displaying the requested information or saving it to a file (December and Randall, 1994).

The second part of the URL (www.nlnet.nf.ca) is the host name, which is sometimes referred to as the **domain name**. It is the name of the computer where the Provincial

Advisory Council has its SLIP account. WWW stands for World Wide Web. Nlnet is the network name, nf stands for Newfoundland, and ca stands for Canada. Every computer on the Internet has an Internet protocol (IP) address associated with it. IP addresses have four parts, each separated by periods (e.g., 123.12.17.59). For the most part, users do not need to know the details of IP addresses, although it is helpful to know that they are a numeric equivalent of regular Internet addresses. Each computer on the Internet has a domain name, which is assigned a unique numeric equivalent. Something called a **domain name server,** which is a worldwide database, keeps track of all of the names of the computers on the Internet. The worldwide domain name server works in conjunction with a domain server on your Internet provider's computer, which must translate domain names into their numeric equivalents. Occasionally the domain portion of a URL is incorrect (or out of date), and you get something called a DNS lookup error, which means that something somewhere isn't as it should be, and the domain name portion of the URL you specified could not be translated into a proper Internet Protocol numeric equivalent.

The final part of the URL (/commercial/pacsw/pacsw.html) contains information about the directory structure on the computer where the Provincial Advisory Council's home page is stored (it is called commercial/pacsw), and the name of the file that contains the html file (pacsw.html) which, when displayed through a browser using the hyper-text transfer protocol, produces the home page found on p.77.

THE WORLD WIDE WEB AND WOMEN'S ORGANIZATIONS

Although the World Wide Web is a relatively recent phenomenon, it has caught the interest of many women's groups, on both a local and a national level. One woman I know commented that with the older text based computer networking systems, she always felt that something was missing. The WWW provided her with graphics along with text, which improved the quality of on-line communications for her. The graphical nature of the WWW along with its point-and-click interface may be providing an entry for women who might not otherwise venture into the world of computer networking. Although the hardware and software required to use the WWW may be more expensive and difficult to use than the older shell based communications programs (and in that sense less accessible to women), the perceived ease of using the WWW may be increasing the accessibility of computer networking technology for women.

Several women's groups have created home pages on the WWW. For example, in my community, the St. John's Status of Women, Women's Center has a home page outlining the services it offers. And, as previously mentioned, the Provincial Advisory Council on the Status of Women, Newfoundland and Labrador has a home page, that includes information on the organization's philosophy, who the staff members and board members are, and what kind of workshops the organization delivers. In addition, the PACSW home page lists all recent publications, along with summaries of those documents. The Memorial University Women's Studies Programme has a home page (the url is http://www.mun.ca/womenst) that includes information about the programme, regulations, course offerings and events sponsored by the programme. In addition, course outlines for some courses are on the Web page.

Recently discussion has begun about creating a Newfoundland women's community home page, that will include hypertext links to additional organizations.

Several groups in the non-profit and social change sectors have established home

pages and WWW sites. In the United States, these have included the National Organization of Women, the Feminist Majority, the Ms. Foundation for Women, and numerous women's centres and women's studies programs.

Recently there has also been a growth in the area of commercial computer networking services for women. On established computer networks such as CompuServe Information Service, and one of its major competitors, America on-line, discussion groups for women have become more common. At the same time, some stand-alone services for women have evolved, such as the Women's Wire (located in California), which offers access to the WWW. In Canada, in addition to local initiatives to establish home pages catering to the women's movement, at least one group is attempting to access to women's resources to the World Wide Web.

On September 6, 1995, WomensWeb began operation. Located on a computer in Toronto (that is, in fat part of the computer network that evolved in part from PeaceNet), WomensWeb advertises itself as "Canada's first Internet based service and support program for women." It aims to increase women's access to computer networking technologies and information sources "by providing state-of-the-art online (sic) tools and resources developed in partnership with women's groups from across Canada." A definite selling point of the WomensWeb is that it is advertising that its services are backed by an outreach program that includes training and support activities implemented by NirvCentre, the non-profit group that runs the Web (the national social change computer network that grew out of PeaceNet). These include a woman's guide to electronic communications, user support in both French and English, and training, including a 'train the trainer' program.

WomensWeb is a full service commercial (non-profit) information provider. If offers electronic mail, newsgroups as well as computer conferencing facilities, databases, and the ability to create and maintain WWW home pages (often referred to as WWW publishing). In addition, several documents (including many documents related to the 1995 United Nations Conference on Women held in Beijing) are available on-line. The WomensWeb offers computer conferences on topics such as women and development, women and health, women and labour, women and the media, and violence against women. Promotional materials list several organizations using WomensWeb for communications, including Advocates for Training and Education for Women, Canadian Association of Elizabeth Frye Societies, the Canadian Beijing Facilitating Committee, Canadian Congress for Learning Opportunities for Women, Mediawatch, the National Action Committee for the Status of Women, the Voice of Women for Peace, the Women's Television Network, the Young Women's Christen Association, and numerous other groups. WomensWeb listed my organization (Women's Studies at Memorial University) as a network user in its promotional materials. However, we do not use that network for our organizational communication. Rather, one or two individuals from our group have private accounts on the WomensWeb. It may be that the same is true for some of the groups that WomensWeb is listing as organizational users.

In order to assist women's groups and individual women in gaining access to WomensWeb, the organization has developed a discounted subscription rate of $99.00 per year, which includes 3 hours of free on-line time per month during the first year. Users must also pay a one-time account setup fee of $25.00 plus GST. For users who have another way of gaining access to the WWW (e.g., through a university or a Free-Net), the WomensWeb also sells access (at a rate of $5.00 per month for individuals, or $50/year for non-profit groups)

to the 'Web Networks.' The Web Networks give users who connect to WomensWeb through other networks access to 'value added' services on the Web (otherwise only accessible with a Web or WomensWeb account). WomensWeb is a service of the Web Networks, which is a member of the Association for Progressive Communications (APC). APC is an internationally integrated system of 18 regional computer networks serving large and small non-profit organizations and individuals in over 130 countries.

ISSUES ARISING FROM THE DEVELOPMENT OF THE WORLD WIDE WEB

Perhaps because of its compatibility with commercial interests (it is easier to sell products to consumers if consumers can see those products, which is made possible through the WWW), or perhaps because computer networking technology has simply been around long enough to have gained a wider following, the WWW seems to be capturing the interest of an increasing number of women's organizations. In adopting WWW technology, the women's movement will face several issues.

First, several organizations are using computer equipment that will have to be upgraded before they are able to gain access to the WWW. Required upgrades may be as simple as purchasing and installing a new (faster) modem, or may require purchasing an entirely new computer capable of running a WEB browser.

Second, we will have to expand our concern about creating information elites to reflect the fact that some people have no access to computer networking resources, others have access only to Shell based systems, some can gain access only through Free-Nets (which limit the amount of time each day a user can be on-line), and the information privileged have access to a full suite of services, including the World Wide Web. As a community we will need to insure that we do not create two totally separate communication channels-- one that handles only text, and another that handles text, graphics and hypertext. (Although it is possible to integrate both types of systems, for example by building hypertext links between Gopher documents and WWW pages, which would allow WWW users to gain access to relevant material on Gopher systems, media hype and a commercial push towards the WWW have left many with the impression that the WWW and Gopher are two totally separate systems, that users must choose between). Finally, and perhaps most significantly, we will need to make sure that as we put our organizational resources into communicating with others via the WWW that we do not neglect our traditional ways of communicating with the women we exist to serve.

CHAPTER 5

ACCESS ISSUES

INTRODUCTION[20]

Although computer networks can and are being used to facilitate community organizing in the women's movement, their value as an organizing tool is not guaranteed simply as a function of their use. Social and technical choices are made during the design and implementation stages of computer networks that ultimately determine the value of computer networks as an organizing tool in the context of feminism and other forms of social change. In order to understand why some attempts to use computer networks have failed, why others have succeeded, and the limitations and strengths of computer networks in the context of social change, this chapter begins by outlining how computer network structure is related to the types of communication occurring on networks structured in different ways.

Questions addressed later in this chapter include: how are women using computer networks in the context of feminism? Who are the participants that come together to form feminist groups through computer networks, and what are they talking about? What is the nature of the communication processes that are occurring on-line, and are they related to network structure? What kinds of group processes occur in this social context? What are the norms of communication, and how are they enforced? Is the accessibility of a computer network (e.g., whether anyone can access it or access is restricted) related to the tone and content of communication on computer networks?

These questions are addressed below in relation to the theme of access. For example, each network structure makes some forms of communication accessible and not others. On some computer networks participants communicate as if they are in a consciousness raising group, while on other networks it seems that the only accessible forms of communication are antagonistic. Not only does the array of communication options available vary with the structure of the network, but in addition, the structure of a computer network has implications in terms of who can gain access to a network, from which locations and at what costs. Network structure also has implications in terms of whether or not users can interact with the computer system in more than one language. The accessibility of all computer systems to a non-technical audience is hindered by mystification of language and concepts related to the use of computers. When computer networks are used by feminist organizations, they are introduced into an organization with a particular structure that must be taken into consideration when systems are implemented, if computer networks are going to serve their intended purposes.

[20]Material in this chapter is based on four in depth case studies, discussed in detail in Balka, (1991).

THE RELATIONSHIP OF COMPUTER NETWORK STRUCTURE TO COMMUNICATION POSSIBILITIES

Although it is often assumed by novice users of computer networks that the use of any computer networking facilities will support a full range of electronic communication options, this is in fact not the case. Each physical network structure supports a different array of communication options, and within any given category of computer network structure (for example local single node computer bulletin board systems), implicit and explicit social decisions appear to affect membership in discussion groups that exist on-line, as well as the norms for communication that evolve and are maintained on computer networks.

In understanding this phenomenon, it is important to recognize that the design and implementation of computer networks is a complex process, embedded in the larger context of society. In some senses, this process itself determines how individual women, feminist and other social change organizations use computer networks in the context of social change work. Similar to Franklin's (1990) analogy of a house built by technology in which we all live, our actions affected by its design, the analogy of computer networks as a party is useful in illustrating how social choices interact with technical decisions to produce a computer network that supports some forms of communication and not others.

In comparing computer networks to a party, the place a party is held (for example a room or building along with the furniture in it) can be thought of as similar to the physical structure of a computer network. The format of the party (e.g. cocktail party vs. dinner party vs. potluck brunch) as well as who is invited can be viewed as social characteristics, similar to social decisions made about the computer network.

If the room selected for a party has very formal furnishings, most guests will make some attempt to act appropriately formal. Similarly, if a party is held on a beach, a different mood is conveyed, and most guests will be inclined to dress and act more casually. In a similar fashion, decisions about what computer hardware and software are used for a network, and how the network is physically organized determine the types of communication possible, and set a stage for social interaction on computer networks. For any particular physical network structure, some things will be true, regardless of who the users are.

If users of a multi-node computer network (other than Usenet) decide they want to exchange thoughts on women's issues, participants at each node must decide on a common node to coordinate the distribution of messages coming in from all nodes (e.g., the list server for PAR-L is located at the University of New Brunswick). In contrast, if users of a single node wide area network (for example the WomensWeb) wanted to have a discussion about women's issues, they might begin by deciding whether to have their discussion via a mailing list (similar to multi-node systems), a bulletin board (similar to a single-node local system) or a conference.

When people host parties, they make many social decisions are made: whom to invite, whether children are welcome, whether alcohol is served, whether events are determined by guests spontaneously or are orchestrated by the hostess and so on. Similarly, within the limitations inherent to whatever physical network structure has been chosen as the infrastructure for computer-mediated communication, many explicitly social decisions must be made. For any

communication act, decisions must be made about whom to include, and in some cases (a mailing list or computer conference) whether the information exchange should be moderated or unmoderated. If a decision is made to form a moderated group, criteria for the moderator(s) to follow must be determined.

If a group's goals are simply to explore a set of issues with people who are geographically dispersed a list server might be an appropriate solution. Or, if the potential to have structured discussions between several people on specific issues is desired, (computer conferences) along with access to resources such as databases containing bibliographies and mailing lists, a central-node commercial system might be most appropriate (such as WomensWeb). This is the type of service the founders of the Amazon Line, (from Toronto) hoped to provide, and supporters of the CompuServe Information Service Women's section attempted to ensure.

If the main goal of organizing efforts is to increase the information flow between individuals and/or organizations in a single city, a single node computer bulletin board system might be most appropriate. The Women's Bulletin Board system in New York City attempted to serve this function for that city's women's community. Or, if encouraging daily communication between board members and committee members of a nationwide women's organization (many of whom have institutional access to computers), is desired, a private multi-node mailing list might be most appropriate. The Canadian Research Institute for the Advancement of Women (CRIAW) has taken this approach (combined with extensive use of fax machines) in meeting some of their organizational computing needs.

With recent advances in computer networking technology (especially telnet, gopher and the WWW), it is harder to make generalizations about the range of services associated with different types of service providers. Nonetheless, it is important to know that not all types of services (e.g., list servers, newsgroups or computer conferencing) are available through all information providers, and it is important to make sure that the type of service your group wants to use is available from the information provider you select. Towards this end, a series of questions for your group to answer, and another series of questions for your group to ask prospective service providers, are included in chapter 7.

THE TONE AND STRUCTURE OF ON-LINE COMMUNICATION

The structure of a computer network not only has implications in terms of what types of communication services are available (e.g., computer conferencing, databases), but also has implications in terms of the tone and structure of communication. The design of a house has an impact on how people in a house interact; so too does the design of a computer network.

Although numerous factors (such as who participates in on-line discussions, the norms that are established and agreed to on-line etc.) contribute to the tone and structure of computer communication, the structure or design of a computer network is an important factor that is often overlooked in discussions about the nature of communication that occurs via computer network. A few examples of how network structure can influence the tone of on-line communication are presented below. They are taken from an in-depth study I conducted (Balka, 1991) of 4 on-line groups dedicated to the discussion of women's issues.

Messages that together made up the bundled electronic discussion group called Soc.women can be characterized as

inflammatory and antagonistic. Although individual messages may be benign, the overall mood of the group was that of a battleground, or contested terrain. Several factors contributed to this, including where users could gain access to the network, the fact that messages were received at different sites in different orders (rather than chronologically), and that Usenet was intentionally designed to be difficult to control.

The protocol (set of rules) used in the transfer of Soc.women messages around Usenet results in users at different sites viewing the messages in an order that varies from location to location. As a consequence of this, a user might receive a response to a message prior to the original message. In order to contextualize communication under these circumstances, a mechanism was built into the software that prompts users to include a portion of the message they are responding to, in their response. This leads to a convention I call attributions, or quotes of previous messages 5.1, The Anatomy of a Usenet Message on p.72). In part as a consequence of this Usenet feature (which has since been incorporated into non-Usenet electronic mail programs), Soc.women messages tend to read like a 'he-said-she-said...but you didn't understand' argument. This, combined with numerous accusations of message forgery (supported by the software feature that allows aliases on Usenet) and the often contentious nature of feminism in general, contributed to a general climate of antagonism in Soc.women.

In a sense, women's access to Soc.women as a discussion space for feminist issues is restricted or controlled through the contentious nature of the discussion that occurred on that network. The availability of Usenet (until recently, it was primarily available in scientific and engineering workplaces dominated by men, who are often engaging in dialogues about feminism for the first time) also contributed to the contentious nature of Soc.women. With men outnumbering women in the professional ranks of scientific and engineering workplaces,[21] discussion space was easily dominated by men. The struggle between men and women to set the agenda for discussion and gain control of the group contributed significantly to the argumentative nature of Soc.women.

The tone and structure of on-line communication can also be affected by profit and payment arrangements entered into between computer network sysops and their employers. For example, in the case of the CompuServe Information Service, systems operators were paid (or given credit to use CIS for free) according to the amount of traffic their area of the network generated. This created an incentive for the system operators to get CIS subscribers to both read and make contributions to their area of the network. Consequently, some sysops placed controversial material on-line, hoping to bate users into responding and debating. Others took it upon themselves to respond to any (and in some cases) all messages. This combined with a software feature that allowed message threading (grouping messages according to topic) and encouraged users to read messages by the thread resulted in a series of one-to-one (as opposed to many-to-many) on-line exchanges between the area sysops and individual users (see Figure 5.2, p.73 for an example).

TONE OF COMMUNICATION AND SOCIAL INTERVENTIONS

Many people do not want to participate in the argumentative type of communication

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[21] Although many women work as support staff in scientific and engineering workplaces, these women are largely invisible in Soc.women. This likely reflects workplace culture that denies women in these positions much discretion about how their time is spent.

described above (though a an alarming number of people seem to enjoy it). A number of social interventions have been adapted to lessen tension and antagonism on-line. For example, contributors of the Femail mailing list (a multi-node bundled electronic mail group) removed message header information from submission. When contributors submitted message to the list, they were required to submit their names (although in special cases, after negotiation with the group's moderator contributors were allowed to use pseudonyms). Because contributor's names were linked to their submissions (and aliases were generally not allowed), contributors were in a sense held accountable for the content of their messages. At the same time, the removal of message headers meant that if someone reading the group felt compelled to respond antagonistically to a message, not knowing the individual's e-mail address, they had no choice but to respond to the list. If their submission was deemed too antagonistic by the moderator, it would be rejected. In essence, the social intervention of moderation, combined with removal of the message headers helped create a safe and comfortable environment for Femail mailing list readers, which allowed that group to function like an on-line consciousness raising group for those who participated in it (see Figure 5.3, p.74 for an example).

A slightly different strategy was used by founders of the WBBS. The computer program being used by the WBBS asked users the first time they accessed the system to provide their name and telephone number. WBBS organizers checked user's information to verify that users were not misrepresenting themselves. In most areas of the WBBS, users names were attached to any messages they submitted to a discussion area. However, WBBS organizers felt that there were some topics that WBBS users should have an opportunity to discuss anonymously (such as sexuality). They created an area of the bulletin board system where female users were able to speak anonymously about sex and sexuality. By limiting the scope of anonymity to discussions of a sensitive nature (as opposed to allowing anonymity on the entire bulletin board), WBBS were able to virtually eliminate antagonisms that often result when computer network users are able to either make anonymous contributions, or are able to represent themselves as someone other than who they are.

Another social intervention the WBBS introduced was the Battleground. WBBS founders were struck by the antagonistic nature of communication on many computer bulletin board systems, and guessed that many women avoided both reading and contributing to bulletin boards in order to avoid high degrees of antagonism. Looking for a way to both allow disagreement and create on-line spaces free of antagonism, they developed the Battleground. The Battleground was a discussion area on the WBBS. When discussions that took place on other parts of the WBBS became antagonistic, WBBS sysops would remove the offensive messages from the discussion area they were originally placed on, to the Battleground. That way, if a user wanted to read the WBBS and not have to deal with 'flaming' and heated debates, she could simply elect to skip the Battleground discussion area. Or, if a WBBS user was interested in participating in a heated debate, she could simply go to the Battleground, and take up as much space as she wanted to, without risk of subjecting those who didn't choose to read the Battelground to her tirade.

NETWORK STRUCTURE AND THE ACCESSIBILITY OF NETWORKS TO DIFFERENT USER GROUPS

Message structure and style often reflect both the physical structure of a computer network, and a number of social decisions (e.g.,

to permit aliases and anonymity), that are incorporated into the software. For many users, both the physical structure of the network, and the social decisions incorporated into the network through software design, are invisible. Once these relationships are examined, it becomes clear that some combinations of network structure and software design provide access to some groups of users while deterring others.

The structure of a computer network has implications for where a network is accessible (e.g., in universities but not women's centres), and to whom it is accessible. The gender composition of participants varies from network to network, as do participant's patterns of response on a network. Each network has a somewhat distinct group of participants, though some overlap exists between networks.

Although the convergence of computer networking resources is allowing users of types of networks (such as community based Free-Nets) to gain access to services that were previously available primarily in academic and engineering workplaces (such as Usenet newsgroups), it remains true that different types of networks tend to attract different groups of users. For example, list servers tend to be more easily accessible in academic and engineering workplaces, and so, many list server readers are part of the academic and professional communities. Interestingly, many community bulletin boards and Free-Nets have 'full' electronic mail capabilities (meaning they can receive electronic mail from virtually any e-mail address). However, a lack of information about both what list servers exist, and how to subscribe to them, prohibits many Free-Net and other non-academic users from accessing these services.

Due to their cost, commercial computer networks tend to attract fairly affluent users. Often people who use commercial service providers are full time workers, who do not have a full range of networking services available as an employment benefit. Additionally, small businesses and non-profit organizations are increasingly using commercial service providers to meet their communication needs. Not surprisingly, there is specialization amongst commercial service providers, as evidenced by commercial services such as the Web and WomensWeb, which hope to attract non-profits in general and feminist non-profits in particular to use their services. Although the cost of these services may not always be the lowest, the use of these services by many like-minded groups may facilitate sharing of information between organizations.

As a general rule, if you want to make a service accessible to a particular group of users, you should try to determine what types of computer networking systems those users have access to, and what services they are accustomed to using, and choose a service that they other users are familiar with. In other words, even if you think that the World Wide Web is the neatest thing since store-baked bread, don't use it as the sole means for distributing information on-line about your group if you are attempting to make your information available to the single mom's against poverty, who aren't likely to have access to the more costly technology that accessing the WWW requires. Or, if you want to encourage participation of activist women in your on-line discussion, you might choose to make your on-line resource most accessible through a community Free-Net, rather than a list server, which, though accessible through many Free-Nets, may be more difficult for activists to access than a discussion sponsored by a Free-Net.

Finally, network structure has implications for access in that some information providers may not allow 'restricted' access discussions on their networks (e.g., discussions open only to those members of your organization), while others (such as the WomensWeb) may encourage it. You should be

sure that if you are using computer networking for communication within your organization (e.g., between board members), that the network provider you choose has mechanisms in place that will allow your group to have a 'private' discussion space.

Figure 5.1: The Anatomy of a Usenet Message

Headers

```
516.  Path: fornax!ubc-vision!alberta!ihnp4!homxb!whuts!mtune!rutgers!husc6!necntc!rayssd!rth
517.  From: rth@rayssd.ray.com (Ruth Thomas)
518.  Newsgroups: soc.women
519.  Subject: Re: Earthsea is Juvenile?
520.  Message-ID: <1768@rayssd.ray.com>
521.  Date: 19 Jan 88 17:58:42 GMT
522.  References: <22867@cca.CCA.COM> <98900002@convexs>
523.  Sender: rth@rayssd.ray.com (Ruth Thomas @ Raytheon Company, Portsmouth RI)
524.  Reply-To: rth@rayssd.RAY.COM (Ruth Thomas)
525.  Organization: Raytheon Company, Portsmouth RI
526.  Lines: 36
```

Attributed text

```
527.  Jane Moore writes:

528.  > So, what I was thinking of doing would be to keep my name, my spouse keep
529.  > his name, then give the boys his name and the girls my name.  Then hopefully
530.  > we recognize a lineage of females as well as the lineage of males.  I guess
531.  > the family as a whole could be recognized as the joining of two lines, one
532.  > from the male, the other from the female.  What do you all think of this?

533.  And Bill Williams responds:

534.  > Personally, I think there are much more important things to think/worry about
535.  > If/when I marry, I suppose the name issue will have to be addressed, but
536.  > I'm not about to make a big deal of it...
```

Original text

```
537.  As gently as I can:

538.  Yeah, well *Jane* said she was worried about it *now*.  This is a
539.  prime example of what has been mentioned here as "trivializing a
540.  woman's concerns."  I know you do not mean this, but here it is.
541.  Often, when we (the general "we") claim that subtle sexism is
542.  everywhere, we are challenged to define it.  So we define it, and we
543.  are challenged to give "specific examples of when *I* do it."

544.  So I'm giving a specific example.

545.  By the way, Jane, I like your naming scheme.
```

Signature

```
546.  --Ruth Thomas
547.  rth@rayssd.ray.com
548.  {allegra,cbosgd,gatech,ihnp4,linus,necntc,raybed2,uiucdcs}!rayssd!rth
549.  ---------------------------------------------------------------------------
550.  I do not think my company *has* an opinion, so the ones in this
551.          article are obviously my own.
552.  ---------------------------------------------------------------------------
553.  "It's often said that life is strange, oh yes, but compared to what?"
554.          -Steve Forbert
```

Figure 5.2: A Sample CompuServe Information Service Message

Headers

Body of messages

Computer generated messages

```
2157.   #133440  Feminist vs Libber                ←Title of message thread
2158.   S 5 / Men/Women's Issues                    ←Place where these messages appear
2159.   19 messages                                ←# of messages about this topic
2160.   Read? (Y or N) ! y                         ←System asks user for input
2161.   #: 133440 S5/Men/Women's Issues            ←Message #
2162.   04-Feb-88  11:04:49                       ←Date
2163.   Sb: #Feminist vs Libber                   ←Title of message thread
2164.   Fm: Scott 76266.2273                      ←Message sender
2165.   To: Sysop Elvira Casal 72247.3505 (X)     ←Person the message was written to

2166.       A believer in Women's Lib (which I will call a "libber" to save space.
2167.   and the way I often refer to myself-lest you see it as a slur), accepts that
2168.   women have been unfairly treated in our society, often oppressed and degraded.
2169.   and believes in liberating women to more fully share in our society, and
2170.   liberating men to better accept this necessary and proper state of affairs.
2171.   This to me is the road to true equality, to freeing BOTH sexes from the bonds
2172.   and shackles of our own ignorance and stupidity.
2173.       By contrast, a feminist is precisely that, a believer in a "women's
2174.   movement", something that is antithetical to a libber.  From what you say, I
2175.   would suspect that you are closer to my definition of libber than feminists,
2176.   though I accept that I may be somewhat presumptive in my analysis.  I reject
2177.   feminism as a sexist ideology, completely opposed to all that I believe in,
2178.   particularly because it offers no role for men, other than as negative role
2179.   models, or a sort of castradi auxiliary.  Libbers, by contrast, are of all
2180.   sexes, and in fact the very essense of what a libber is DEMANDS both sexes be
2181.   involved, something that is often explicitly rejected by feminists.  May I
2182.   suggest considereing the difference between say, Andrea Dworkin (feminist,
2183.   though a somewhat extreme example), and Judy Goldsmith (a somewhat feminized
2184.   libber).  Other examples of feminists include Elly Smeal and Molly Yard, while
2185.   some libbers might include Grace Hopper or (to some extent anyway) Gloria
2186.   Steinem.
2187.       Any comments?

2188.   2 Replies                                  ←Indicates to readers # of replies to this message

2189.   *** More ***                               ←Indicates to reader more information is to follow,
                                                     and tells the reader what commands are possible
2190.   Enter command. N for next                    from this point
2191.   message or <CR> for menu !n
```

Figure 5.3: A Sample Femail Message

Headers

18153. From: decvax!watmath!j
18154. Received: by decvax.UUCP (4.12/1.0)
18155. ?id AA29271; Thu, 12 Apr 84 01:59:17 est
18156. Date: Wed, 11 Apr 84 10:22:22 est
18157. From: decvax!watmath!jamcmullan (Judy McMullan)
18158. Message-Id: <8404111522.AA22450@watmath>
18159. To: decvax!randvax!edhall
18160. Subject: Group Messages 1 to 6

18161. February 29, 1984??Message 1 ←Indicates beginning of first message

Body of first message

18162. This is the inaugural message for the "feminist" mailing list.
18163. I guess it is to be expected that it would be impossible to reach a consensus
18164. of 38 people! The original proposal asked if this should be a
18165. woman-only group or a feminist group (or some intersection set of those) and
18166. a choice had to be made! Of the 30 women who responded, most either
18167. didn't tell me their feelings or didn't object to having men in the
18168. group. There were 6 women who really wanted men to be included and
18169. 17.women who really didn't want to have any men in the group. There
18170. were 8 men who wished to be included. So, it was really rather
18171. difficult to see any clear consensus. I have therefore made the
18172. decision to include everyone who wanted to be in the group.

18173. The first few respondents didn't care whether the group was moderated
18174. but then I got about 1/3 who were in favour of it. So, mail your
18175. submissions to me and I will forward them. Of course, if you wish to
18176. make a private follow-up to a group mailing, you are always free to
18177. do so.
18178. Since everyone on the list has managed to send me mail, I think you
18179. all know a valid address to me. I have signed my full mail address,
18180. once again, in case you would like to refer to it. After this, I will
18181. just sign "Judy" or something!
18182. As moderator, I will not forward any non-constructive flames (esp.
18183. from woman haters/fearers) but if I seem to be forwarding junk, please
18184. let me know and I will tighten up my criteria for exclusion.

18185. I would have liked to have some snappy first topic to include in this
18186. mailing but I spent the afternoon deep in a fog of hacking and I don't
18187. think my brain has emerged yet. Perhaps I will be brighter later in
18188. the week.

18189. --Jane McMullan
18190. ...!{allegra|bunker|clyde|csin|decvax|hcr|
18191. linus|sunybcs|syzygy|tritonlutcsrg|utzoo}!watmath!jamcmullan

Indicates how to respond ←privately to message

18192. ----------
18193. March 2, 1984?Message 2 - from Sophie Quigley ←Indicates beginning of

OTHER FACTORS THAT INFLUENCE THE ACCESSIBILITY OF NETWORKS TO DIFFERENT USER GROUPS

A number of other factors come to bear on both what type of communications network users have access to, and who has access to what types of computer network and what features on each network. In this section I consider some of the factors that come to bear on who has access to what kinds of information via computer network. Among the issues I address are costs of accessing a computer system, bilingualism and the accessibility of computer networks, and the general mystification of computing by technical experts. Throughout my discussion I include examples of social innovations that can help groups avoid the creation of information elites based on who as individuals can afford access to a group's computer networking system.

Costs and Access

There are a number of issues related to the costs of using computer networking services. A failure to understand these issues can produce a number of undesirable effects, varying from under utilized networks to a shift in organizational decision making, that reflects the financial well-being of network users. Some of the issues that arise in relation to cost are considered below.

Cost and Access to Basic Computer Equipment

Before anyone can have access to a computer network, access to a bare minimum of computer equipment is required. In most discussions of computer networking, access to the required equipment (a terminal connected to a computer or a computer, a modem and a telephone line) is assumed. The frequently made assumption that potential network users will gain access to required equipment on their own in order to participate in communication that takes place via computer network can result in the exclusion of all but affluent users (who are not representative of women in general or women's groups). In order to avoid building a network that systematically excludes large groups of potential users, network planning discussions might appropriately include a discussion of how to provide potential users who lack access to equipment with the access they will require in order to participate in discussions that take place on a computer network.

In order to ensure that all those who should be involved in group decision making (e.g., by virtue of their membership on a board of directors for a group) have access to a computer network being used by the group to support communication and decision making, some groups have provided equipment on loan to members for the length of their term. Such loans have ranged from lap-top computers to modems. In one case where getting a group member onto a computer network was deemed impossible, she was loaned a fax machine, so that other members of the group could download discussions that had happened on the computer network, and forward them to her by fax. When she wanted to make a contribution to the discussion, she simply faxed the central office back, and they in turn placed her comments on the computer network where other group members could see them. This type of hybrid system has gotten easier to manage in recent years with the advent of fax-modems. Fax-modems combine the features of a modem with some of the features of a fax. Fax-modems allow one to receive a fax and print it out via computer, or, alternately, place the contents of a received fax in a computer file for future editing or uploading to a computer network. If

planning this type of system, it is important to allocate staff time for converting electronic mail messages to faxes and vice versa.

The cost of modems varies from about $80.00 for a 14,400 baud modem card (that is installed in your computer) to $300.00 or more (before taxes) for a 28,800 baud modem. External modems (that plug into the back of your computer, instead of going inside it) cost a little more, but are easier to use as 'loaner' modems. With the emergence of the World Wide Web, it has gotten more difficult to buy a 2,400 baud modem although they are still perfectly adequate for text-based computer networking. If a group is hoping to use a computer network to take care of some of its communication needs, purchasing modems to be loaned out for those members of their group who have computers but not modems may be a very cost-effective way to facilitate on-line group communication. However, this should not be done in the absence of technical support, which is usually required to get the modem and related software installed and functional.

Unfortunately, with the emergence of the WWW many groups and individuals are finding that in order to take advantage of the graphic capabilities that the WWW offers, they have to upgrade their entire computer system, which of course can be quite costly. Any individual or group facing this decision should seriously consider using a WEB browser designed only for text (such as Lynx for DOS based machines) as it will certainly be less expensive than a new computer, and will probably be a lot less aggravating than purchasing and setting up a new computer.

COST AND NETWORK STRUCTURE

Access issues vary depending on the structure of a computer network. For example, if a group of women academics (who are not attempting to make their network accessible to community based women) decide to develop a computer network, they immediately have at least three potential structures available to them: a Usenet newsgroup or an Internet discussion list,[22] a wide area multi-node network (such as Femail), or a List Server, such as the PAR-L list. If any of these structures are selected, the costs of operating the resulting network are typically covered by the institutions participating in the network (universities and scientific and engineering workplaces). In many instances it is virtually impossible for an institution to bill for electronic mail costs separately from other forms of computer use, which typically results in a situation where computer network communication costs are indistinguishable from other costs of using a computer system, and though they may be billed to a department, are infrequently billed to individual users. Although this has been the case, economic pressures have in some cases motivated some institutions to bill workers or departments for services (such as network use) that previously were non-billable expenses. Certain groups of potential network users (e.g. students as opposed to professors) may be more vulnerable to cost recovery programs. Many universities are now also selling computer accounts to the general public on a fee-for-service basis, in efforts to compete with a wide range of 'Internet' providers. In some circumstances, cost of accessing or using a computer network may not initially be considered an issue, but may resurface as a critical issue if users of the above fictional network decide to broaden access to the network to include community based women. Immediately, access to the network (usually

[22]In order to begin a group on Usenet a series of procedures (which include gaining support for the group's existence from a specified number of Usenet users) must be followed. Procedures to be followed to begin a new Usenet group are supposed to be available on all Usenet network nodes, however they may not be.

through an institution) must be secured, and, in most cases paid for. For example, in my community, many women's organizations have purchased access to the Internet through my University. We have access to the same features once we sign onto the computer network. However, one very important difference exists: I use the computer for free as a benefit of employment, and my colleagues in women's organizations off campus must pay (often by the minute) to use the same network and gain access to the same information and discussion spaces. Although I may find a high volume list server irritating to the extent that I must invest time in removing a high volume of messages from my electronic mailbox each day, I do not have to lay out real dollars and cents for the privilege of doing this. In contrast, my colleagues downtown are accruing per minute charges during the time it takes them to dispose of messages from the same fictional high volume list server.

Geography, Network Structure and the Cost of Access

If a group decides that it really needs to have access to highly structured communications afforded by a computer conferencing system that runs on a wide-area central node network (such as WomensWeb), another problem arises: ensuring that users in sparsely populated areas do not have to pay higher access costs than their urban sisters. Although the CRTC (Canadian Radio-television and Telecommunications Commission) ensures that regular telephone service is universally accessible (meaning that it doesn't matter if you live in Vancouver B.C. or Nain, Labrador you have access to the same basic telephone service at more or less the same cost), universal access to data communications has eluded federal legislation. This topic is likely to be if increasing concern to women's organizations, and would be a good area of concern for feminist lobbying efforts in the future.

If you live in a large densely populated urban area you are likely to find that a commercial information provider (such as CompuServe Information Service) provides data access lines in your community that allow you to access their system at a reasonable cost. If you live somewhere like St. John's Newfoundland you are likely to find that commercial providers aren't providing their own data access lines in your community, because there isn't enough of a profit margin to make it worth their while. You probably could gain access to a computer network elsewhere in the world through Datapac, at considerable extra cost to yourself. However, if you live someplace like Nain, Labrador, chances are very good that you have access to regular phone lines, but lack access to either a commercial provider's data access lines or to Datapac. It would cost you regular long distance phone rates to communicate via computer, and your communication costs would be significantly higher than those borne by other members of your group in St. John's or Vancouver.

BILINGUALISM AND ACCESS

Sadly, the politics of bilingualism has not been addressed any better in the realm of computer networking than in other aspects of communication. Computer networks are plagued not only by the fact that not everyone speaks or understands both official languages, but also some other constraints that are specific to computer technology as well.

Although computer programs exist that are supposed to translate from one language to another they are subject to the constraints of language, and in particular the fact that language use and comprehension are contextual. Translating word for word often produces meaningless results. In light of the current level of sophistication of language translation programs, it is not surprising that they have not

been adapted in the context of computer networking.

In the absence of translation software for computers, a few things are often done to make computer networks a little more accessible to unilingual computer network users. For example, if a computer system is an English language system, it is possible to develop a user interface that allows a unilingual Francophone to interact with that system in French. The classic example of this is bank machines that ask the user to indicate their linguistic preference for interacting with the bank machine.

This approach allows unilingual speakers of either official language to send commands to their host computer. However, it does not solve the problem of unilingual Anglophones communicating with unilingual Francophones. Unfortunately, what often happens on computer networks that allow users to communicate with a host computer in either official language is that Anglophones communicate with Anglophones and Francophones communicate with Francophones and bilingual users communicate in the language of their choice, with perhaps a slight preference for whichever language their computer keyboard is designed for. Computer keyboards are designed in such a way that they can easily support the letters of one language, and things get a little more difficult after that. When I write a letter in French, each time I want to type a letter with an accent that is not part of the English language I have to manually select that letter from a symbol menu on my computer and include that letter in my document. If I then send then document to someone else via computer, chances are very high that the process of uploading the file will result in the removal of the accents. Obviously bilingualism is far more complicated than computer support for multiple character sets, but the lack of computer support for multi-lingual interaction with computers doesn't help.

In light of these limitations, perhaps the best solution for a group that wants to communicate in both official languages is to designate one or more group members or staff members responsible for performing summaries of computer network content, in whichever language it was not originally in. If this approach is taken however, it is tremendously important to ensure that the designated translators have the linguistic skills to perform the task, and (particularly in circumstances where paid staff are asked to take this task on) that there is recognition that this task will take a great deal of time and other responsibilities will either have to decrease or be shifted to another worker.

ACCESS ISSUES THAT ARISE WHEN YOUR GROUP BECOMES AN INFORMATION PROVIDER

If your group wants to become an information provider (meaning that your group wants to make some of its materials available to others via computer networks), several issues related to access should be addressed. The strategy you choose for making your group's reports and documents accessible via computer network will influence who has access to those documents, and, to some extent, at what cost.

For example, if your group chooses to make some of its documents available via computer, it will face several choices about how to make the documents accessible. For example, a group could make its documents available by placing them in a computer bulletin board public file area, where anyone using that bulletin board could download them. Or, the documents could be made available through a gopher server, or alternately, through a World Wide Web home page. Placing the documents on a computer bulletin board in a public file download area is probably the quickest and easy

solution for the group, but unless the bulletin board is dedicated to women's issues bulletin board users are not likely to download and view the information. Also, some users may find downloading intimidating. In contrast, placing files on a Gopher server would make the documents widely available (potentially worldwide), but because of the widely held but incorrect assumption that Gopher and the World Wide Web are two separate systems, those using the World Wide Web would be less likely to come across those documents. However, the advantage of making documents available via Gopher include ease of retrieving documents, and that users can gain access to the documents with inexpensive computer equipment. Making the documents available via the World Wide Web would restrict readership to those people with more expensive and up to date computer systems, capable of running a graphic web browser (such as Netscape or Mosaic) or Lynx (for text only). In addition, such a solution would require that anyone wishing to view the documents have access to an information provider which either uses a SLIP connection or provides some other form of access (e.g., through a shell account and Lynx) to the WWW.

MYSTIFICATION OF COMPUTER SYSTEMS AND ACCESS TO COMPUTER NETWORKS

Even if your group does a fabulous job making its information accessible to potential network users, all users of computer networks will have to cope with the mystification of computer equipment that seems to characterize the computer industry, along with low standards for how well hardware (such as modems) and software (such as communications software) works. Although most commercial computer networks provide user information to those who subscribe to their services, such information is seldom adequate to guide a naive user through the process of installing a modem in a computer, installing communications software in a computer, and making it all work as it should. In the past, many computer network service providers have assumed that anyone wishing to use their systems would have the knowledge required to gain access to those systems. Such an assumption may have led tot he downfall of the Amazon line, to the extent that users assumed women could obtain the necessary equipment and make it work, on their own. In contrast, Women's Bulletin Board organizers recognized from the beginning that a general mystification of computer equipment characterized the industry, and that in order for their bulletin board to be successful they would need to provide potential network users with help to get them on-line. In addition to providing help on paper, they also offered help via computer, voice phone, and, perhaps most important, a WBBS volunteer visited local women's organizations and assisted them with hooking up equipment and learning to use it.

In order for computer networks to be accessible to women and women's organizations, both information providers and consumers (network users) must identify and name the mystification of computer systems that characterizes the computer industry. Ironically, although collectivist feminist organizations have stressed the development of skill and sharing of work tasks, observations suggest that with regard to the use of computer systems these noble goals have often been abandoned. Often male friends of collective members voluntarily maintain an organization's computer systems for a period of time, or paid consultants are hired to fix what seems like a never ending stream of computer problems. In both collectivist and bureaucratic women's organizations, the skill required to maintain computer systems is rarely available in-house, and despite an awareness of both work

processes and group process, computer systems have often fallen outside of the scope of feminist analyses and practices. This suggests that the dynamics of expertise may be central to any efforts to make computer systems more accessible to women and women's organizations. This topic is addressed at greater length in chapter 7, where I discuss how organizations can determine their computer networking needs in more detail.

SUMMARY: MAKING COMPUTER NETWORKS ACCESSIBLE

Despite these potential problems, computer networks can potentially be used to both perform tasks (such as the collection and sharing of information) in which many organizations are already engaged, and expand the scope of an organization's activities. In the tradition of good feminist organizing, the adoption of computer networks by feminist organizations should be accompanied by a heightened awareness of group process and concern for working conditions, which I address in chapter 6. In addition, material presented in this chapter suggests that organizations should engage in an explicit process that allows groups to articulate the social goals they wish to attain in adopting computer networking technology. The adoption of computer networks by feminist organizations should make social goals explicit, rather than foster what merely is possible with off-of-the-shelf hardware and software. Extensive care should be taken to ensure that whatever computer networking system is selected will meet the communication needs and goals explicitly articulated by group members.

Computer networks can potentially transcend communicative barriers related to geography and distance. When they work correctly, they allow people to communicate quickly, and in some instances inexpensively. The material in chapter two indicated that computer networks are organized in particular ways that vary from network to network. Computer networks provide opportunities for people to communicate by linking telecommunications equipment together (computers and terminals, telephone and data lines) in different patterns (e.g., wide area central node networks or wide area multi-node networks). The specific physical pattern, or form a computer network takes results in different sets of what Alexander (1974) would call standard situations, that linked together constitute culture.

Alexander (1974) argues that variation in physical patterns in cities leads to differences in the types of standard situations available to people in a culture, and that different situations offer people different role opportunities. In the case of computer networks, variation in network structure and form appears to lead to differences in the types of communicative situations available for participants. Evidence of these differences is found in the discernible patterns in message structure and narrative style that occur on specific networks, but vary from network to network. For example, attributions and attributed text (elements of message structure) are common only to some electronic mail software that prompts users about whether or not they wish to include portions of the message they are responding to, in their outgoing message. They are indicative of a narrative style that is logical and rational. The combination of the physical structure of Usenet and software that organizes communication within Usenet newsgroups presents participants with not only the opportunity to easily create attributions and attributed text, but also the necessity to use attributions and attributed text. Attributions and attributed text contribute to the rational, logical narrative style characteristic of Soc.women messages. The predominance of Usenet structure is expressed in the prevalence of attributions and attributed text, that create a

set of standard situations for Soc.women participants.

In choosing to communicate about women's issues and feminism via a particular type of computer network, group participants are selecting systems that support some forms of communication, and not others. Benston (1988), building on earlier work by Dixon (1974) points out that technology can "be seen as a 'language' for action and self-expression with consequent gender differences in ability to use this language" (Benston, 1988 p. 14). Benston argues that the computer networking systems that are widely available are not the only ones that could have been created, given existing levels of technical possibility. Other computer networking systems might have been developed had system designers had different objectives. In the case of technology, one must use the available tools and techniques in attempts to carry out particular actions; actions are constrained by the technologies that are available. The 'language' for social action provided by available technologies must be understood "as one that imposes limits on what can be 'said'" (Benston, 1988 p. 19). Many actions or expressions of self are not possible if a supporting technology is not available. As new technologies are developed, our vocabulary for action changes (e.g., enhancements to Usenet software accommodated the possibility of moderated groups), but does not necessarily expand (e.g., even though Usenet groups can be moderated, the software does not support chronological sequencing of messages, so the need for and predominance of attributions and attributed text persists).

From the material that was presented in this chapter, it should be clear that a number of factors play a role in how accessible computer networks are to various groups of women. Each type of network offers a unique set of advantages and disadvantages to both users and information providers. In choosing one type of network structure over another, we are implicitly making decisions about the forms of communication that will be available on the resultant computer network. And, at the same time we are specifying the form communication will take through our selection of a physical structure for a computer network, we are making decisions (usually implicit in our selection of a network structure) about who will be able to participate in on-line discussions about women's issues and feminism.

CHAPTER 6

FEMINISM, COMPUTER NETWORKS and FEMINIST ORGANIZING

INTRODUCTION

In considering the use of computer networks in the context of feminist social change, two issues are of particular importance. First, it is important to understand how past uses of computer networks by women interested in discussing women's issues and feminism are related to the larger arena of feminist social change. Second, it is important to consider the potential usefulness of computer networks in terms of feminist social change, and to identify issues that might arise as feminist organizations increasingly attempt to utilize computer networks in organizing efforts.

In this chapter, I first discuss the goals of feminism and how computer networks can be used to meet some of those goals. Next, I address the characteristics of feminist organizations, and discuss the challenges we are likely to face as we attempt to implement computer networking within feminist organizations.

A brief review of the concept of feminism, and the unique form of social change it suggests is an appropriate starting point in considering the use of computer networks in the context of feminist social change.

THE GOALS OF FEMINISM

Feminism is about change based upon an understanding of gender relations. The central concern of feminism is to understand gender-based inequities, while the central task of feminism is to correct gender-based inequities. Although feminism has often eluded definition, Hartsock (1979) has characterized it as "a mode of analysis, a method of approaching life and politics, a way of asking questions and searching for answers" (Hartsock, p. 1979), and identified three characteristics, that, when taken together make a feminist perspective unique. First, feminism focuses on everyday life and experience, that makes action a necessity. Second, the nature of our theoretical understandings are altered and brought into an everyday relation with practice. Third, a transformation of social relations, both in consciousness and reality follows directly from theory, because of its close connections to real needs.

Feminism has provided a forum for women to explore the differences between women's and men's experiences in the world. A number of tools and theories have emerged that have helped us identify a range of cultural assumptions that support asymmetrical power relations between men and women. Feminist activism seeks to alter gender-based inequities. By working with new sets of assumptions derived from feminist theories, feminist activists

develop strategies and implement programs aimed at balancing gender-based power relations.

As Briskin (1991) points out "Feminism is not a unitary discourse or a unitary practice" (p. 25). Indeed, there are both many layers of feminism and many frameworks one might adopt in describing feminist theory, feminist practices, and the relationship between feminist theory and practice. With the aim of both identifying how women's past use of computer networks to discuss women's issues fits into feminist practice, and identifying issues that might arise in the future use of computer networks by women's organizations, it is useful to think of feminist social change as occurring on three inter-related levels. These are an individual or personal level, a group level, and at the level of public and private institutions in our culture.

First, feminist social change occurs on an individual level. That is, individuals become aware of and concerned with gender-based inequities. Many of these individuals seek out groups where they attempt to further the goals of feminism. In light of the emphasis inherent to feminism of everyday practice reflecting theory (and vice versa), within groups feminists often attempt to apply and practice feminist theory. This has led to feminist organizational practices (such as consensus decision making, cooperatives and collectives). Hence, a second dimension of feminist social change has to do with how women work together in groups, and within organizations. A third dimension of feminist social change has to do with how groups interact with the larger institutions (such as governments and religious organizations).[23]

All feminist theories, diverse as they are, either imply or explicitly suggest a strategy for social change that involves interacting with (or opting out of) our society's larger institutions. The three dimensions of feminist social change outlined above evolved along with the contemporary women's movement in Canada.

PERSONAL CHANGE

Central to the concept of feminism is that the personal and political are inexorably linked, as are theory and practice. These close ties between the personal and political, and between theory and practice can be traced back to the emergence of the contemporary women's movement in North America. Many have claimed that in both Canada and the United States the consciousness-raising group (CR group) was an important unit of social interaction and source of personal change (it has also been suggested that CR groups were a white, middle-class phenomenon that often occurred amongst women associated with university campuses).

For many women working in social change activities during the 1960s, a contradiction surfaced. Women participated in activities and belonged to organizations whose goals were to end oppression (class oppression, race oppression), and, within the context of those activities, and within those organizations, they came to realize that they were oppressed *as women*. Women began to develop a consciousness of themselves as women. MacKinnon (1989), in discussing where consciousness comes from describes this process of becoming aware: it

> seems to be a response to an unspecific, often unattached, but just barely submerged discontent that in some inchoate way women relate to being female. It has not escaped women's attention that their

[23]Some feminists consciously choose to *not* interact with the power apparatus. In referring to how feminist groups interact with the power apparatus, I mean to include these groups under the general category of interacting with the power apparatus.

femaleness defines much of who they can be (MacKinnon, 1989, p. 85).

Consciousness-raising techniques explore the social world each women inhabits through her speaking of it, through comparison with other women's experiences, and through women's experiences of each other in the group itself. CR is a means of sharing reliable information about female experience, as well as a way of learning to see and feel the previously invisible effects of patriarchy. In consciousness raising groups, the point of sharing information about personal life and experiences was to connect those into something that could transcend the personal (Adamson, Briskin & McPhail, 1988; Eisenstien, 1983; MacKinnon, 1989).

The CR process bridged the gap between the public and private realms. In order to acknowledge and understand the problems of women, a whole range of questions previously shoved aside as private had to be analyzed, discussed and made part of our social theories. This allowed women to confront issues, and moved those issues from the privacy of the home into the political realm. By encouraging women to speak about what were apparently personal problems, and by discovering the common character of these experiences, the CR process played a key role in exposing the institutionalized, entrenched oppression of women in our society (Adamson, Briskin & McPhail, 1988).

CR helped break down the numbing isolation of personal experience. Women's pain and anger could now be given an external focus, and their helplessness was often transformed into a conviction that social change could be achieved through political action. Consciousness raising had a double aspect; it both examined the means of women's oppression (this led to an analysis of the workings of patriarchy, based on participants' experiences), and it sought to create a small piece of the world where the experience of women mattered, had authority, and was directly useful to other women. The CR process actually changed the view of women as unimportant (that had depoliticized women), and empowered women to become politically active (Adamson, Briskin & McPhail, 1988).

COMPUTER NETWORKS AND PERSONAL CHANGE

Computer networks, under certain circumstances, can provide participants with an experience akin to the CR groups of the 1960s and early 1970s. Through the Femail mailing list, and in certain areas of the Women's Bulletin Board System, participants were able to explore the social reality they shared as women, and develop a consciousness of themselves as women. Through discussion of personal experience, participants were able to discuss personal problems (such as violence within their marriages and dissatisfaction with their sex lives), and see these issues as legitimate areas of concern. In several cases (e.g., a woman who at the onset of the Femail mailing list queried readers about leaving home), participants moved from a state of helplessness to one of political action (e.g., after three years of participation in the Femail group, the woman who had difficulty leaving home had moved across the country and become involved with the women's self defense movement). Through communication with others via computer network, women's consciousness often changed (e.g., a Femail participant came to see herself as the victim of domestic violence), and women began to restructure the social relationships that governed their lives (e.g., a Femail contributor who was a victim of domestic violence left her husband and began to rebuild her life). Experiences such as these suggest that computer networks can offer participants the possibility of exploring the common characteristics of their day-to-day

experiences, and can lead participants to change in their lives.

Unlike the CR groups in the 1960s, moderated on-line discussions (such as the Femail group) may not be a woman-only group. Although many women would have preferred a women-only group, as it exists the Femail group is unusual in that women's voices are heard by men. This offers women who are uncomfortable with excluding men an opportunity to participate in the type of dialogue found on that network, and also offers men an opportunity to 'listen in.' Although there is a fine line between men 'listening in' and dominating the discussion, and some women are undoubtedly reluctant to participate fully in the discussion because men are listening in, this type of mediated discourse provides a unique communication opportunity that deserves to be further explored.

Although the physical structure of the Femail network limited the group's membership on the basis of institutional affiliations, at the same time it brought feminism within earshot of a population (women scientists, applied scientists and engineers) that has traditionally been underrepresented within feminism. Although feminists are often discouraged because we are 'preaching to the converted', networks such as Femail offer the possibility of widening the appeal of feminism to women who might otherwise not take an interest in it. However, under other circumstances, women-only groups designed to promote the type of dialogue found on the Femail network could be formed.

CREATING CHANGE BY WORKING IN GROUPS

Once women have had an opportunity to explore how their experiences in the world are linked to their experiences as women, they often seek opportunities to work with other women at tasks aimed at eliminating inequalities based on gender, or providing much needed services (such as rape crisis centres) to assist women in dealing with the realities of living in a world where women are systematically oppressed. This is often accomplished through working with other women in the context of groups.

Since the late 1960s thousands of women's groups have been organized around numerous issues. Dumont (1986) identified four major objectives of feminist change, that she identified under the headings of the body, employment, a voice and power. Issues addressed under the heading of the body include contraception, abortion, pornography, battered wives, rape, control of one's health, intervention against sexism in therapy, self-defense techniques, support for single mothers, pregnant women and lesbians. Issues addressed under the heading of employment include sexual discrimination in jobs, salaries and promotion; access to training programs, maternity leave and day-care, sexual harassment and the workplace, the impact of new technology on women's work, access to non-traditional occupations, housework and financial support of women in the home. Issues addressed under the heading of a voice include homes for women, consciousness-raising groups, publishing houses and bookstores, plays, shows, films, magazines, publications of all kinds, research groups, conferences and courses, programmes of study, and associations. Finally, women have challenged power in all of its forms, including women's access to party politics.

Women's organizations address not only a number of issues, but exist to perform a number of functions, including lobbying the government, and providing services and education (Barnsley, Ellis, & Jacobson, 1986). Freeman and Macmillian (1976) identify the functions a women's organization can serve. These include the production of a product (e.g.,

books or media resources) or provision of a service (e.g., crisis counseling); the provision of a job and/or skill development for workers (this is often an implicit characteristic of collectivist organizations, and in Canada is made more explicit when government job training funds are relied on for staff salaries); the provision of research or educational services, and the transmission of education and ideas through the media. In Canada in particular it is not uncommon for coalitions to form to plan events (e.g., the March 8th Coalition plans the annual International Women's Day celebrations in Toronto), or collaborate in hopes of improving service delivery in relation to a specific issue. For example, despite suspicions held by members of both collectivist organizations and state agencies, the Inter-Agency Committee on Violence Against Women was formed in St. John's, Newfoundland. It includes representatives from all agencies involved in providing service to women who have experienced violence in St. John's, including the police force and government social service providers.

The activities that women's groups engage in include political lobbying (e.g., trying to persuade the government to change laws governing the accessibility of abortion), providing direct services (e.g., emergency housing for battered women), education (e.g., information about women's occupational health and safety issues), advocacy (e.g., assisting women in preparing an unemployment insurance appeal), organizing (e.g., helping foreign domestics to come together to form a support group or union), coalition and network building (e.g., bringing together representatives from numerous agencies that address violence against women to share information and common concerns), and fundraising (raising money for a range of groups).

FACILITATING GROUP GOALS WITH COMPUTER NETWORKS

Computer networks can be used a number of different ways to assist feminist groups in carrying out their tasks oriented towards change. For example, computer networks can be used in the context of political lobbying to let people know that a problem exists and provide information about how to lobby government officials about that issue. Computer networks can be used to get the word out that an important vote is about to take place, or that a particular government official should be targeted prior to a vote. In addition, increasingly members of government have electronic mail accounts, and they can be directly contacted via computer network.

Computer networks can be used in relation to direct service a number of different ways. For example, in remote communities that lack counseling facilities, trained counselors can be available via computer network to provide women with support and help women cope with difficult situations. Computer networks can also be used to broadcast information (e.g., the phone numbers of emergency services) that people need in order to be able to access services. Or, computer networks can be used to facilitate the tasks of direct service provision. For example, a front line service provider could use a computer network to search for training programs that might fit a client's needs.

Computer networks are frequently used for educational purposes. These range from offering classes via computer conferences, to making materials (such as women's studies course outlines and reading lists) accessible to a wider community via computer network. In addition, organizations can advertise some of the educational services it offers via computer network. This approach has been taken by the Newfoundland and Labrador Provincial

Advisory Council on the Status of Women. They advertise their workshop offerings via a World Wide Web page, which also contains definitions (such as homophobia) related to some of the workshops they offer. Thus, the material used to advertise their educational offerings itself may be educational for some WWW users.

Advocacy work requires a great deal of communication between clients, advocates and whatever body the client is struggling with. Advocacy groups can advertise their organizations services on-line, as well as provide information about specific procedures (e.g., how to appeal an unemployment insurance decision, how to file a human rights complaint) through a computer network. In addition, some communication that otherwise might have been handled by telephone (e.g., between an advocate and service provider, such as a social services agency) could (if all parties were accessible via electronic mail) be handled via computer network. In situations like this, computer networks provide the benefit of a written record of communication that the telephone does not furnish.

Organizing takes a variety of forms reflecting a number of factors related to the group being organized and the issues of concern to organizers. For example, a women's studies student wishing to organize women's studies students into a group for the purpose of influencing curriculum development might attempt to contact potentially interested students through a variety of means including announcements in classes, student newsletters, the campus women's Center, and leaflets posted around campus. If a computer discussion group was available to students, the organizer might attempt to use it to both contact students and discuss issues of concern to the group.

Communication is a fundamental activity of coalition and network building. Even when participants are able to meet face to face on a regular basis, coalition and networking activities can be augmented by computer networking. For example, meeting minutes and notices of upcoming meetings and events can be distributed via electronic mailing lists (if coalition members have access to electronic mail). When coalition members lack access to electronic mail but have access to fax machines, both e-mail and fax can be used to communicate with coalition members. Computer conferencing, list servers or on-line discussion groups can be used to facilitate information sharing between member groups on an ongoing basis.

Many feminist groups depend upon input from board members, steering committee members or caucuses in order to set the group's goals and make decisions about everything from policy and strategy to financial matters. Feminist organizations are increasingly looking towards computer networking resources such as list servers and computer conferencing as a means for communication within the group.

FEMINIST CHANGE AND SOCIAL INSTITUTIONS

A third dimension of feminist social change has to do with how groups interact with public and private institutions in our society. Like it or not, many of our efforts to make change as feminists have to do with interacting directly with public institutions (e.g., using the legal system to change laws), interacting indirectly with public institutions (receiving money from Secretary of State Women's Programs), or involve providing services (such as rape crisis centres) where both public and private institutions have failed to provide much needed services.

The ways that feminists and feminist organizations interact with public and private

social institutions are as varied as the institutions and the groups which attempt to influence those institutions. At a minimum, attempts to influence institutions usually involve developing an awareness of the institution's activities and policies, typically through viewing documents. Increasingly, public and private institutions are making important documents available through computer networks (by placing them on a Gopher server, or making them accessible through the World Wide Web). Recently, in conjunction with the United Nations World Conference on Women in Beijing, the WomensWeb computer network made key documents related to the conference available on that computer network, in the hopes that access to those documents would help feminist groups effectively lobby the United Nations for change.

Clearly, there are numerous ways that computer networks can be used to facilitate personal change, to assist feminist groups in carrying out both communication amongst group members and group tasks, and to gain access to information required to influence public institutions. However, computer networks alone do not perform these tasks. Computer networks require human input and become part of human interaction. When adapted by an organization as part of a communications strategy, computer networks both become part of that social and organizational context, and alter that organizational context. Successful use of a computer networking system requires an understanding not just of the technical aspects of computer networking, but an understanding of the social and organizational contexts into which they are introduced as well. In the following section, I discuss the characteristics of feminist organizations, and issues that can arise when computer networks are introduced into feminist organizations.

THE CHARACTERISTICS OF FEMINIST ORGANIZATIONS

The scope of feminist organizing efforts has been extensive and varied. Although women's organizations are diverse in the forms they take, they often share a rejection of traditional organizational structures based on hierarchy. The evolution of alternative organizational forms in the women's movement is related to the notion that 'the personal is political', that was central to consciousness-raising groups of the 1960s. Consciousness raising groups accommodated a process of discovery, that in turn contributed to the development of a process oriented feminist theory. The theory that began to emerge from CR groups suggested that change for women would require new organizational forms. Lamoureau, Mayer and Raymond (1989) describe the relationship between alternative organizational structures and social change. They suggest that community organizing is a series of activities that can be carried out only by bringing together people who either directly or indirectly have common interests. They point out that community organizing

> is democratic, in the sense that the action has a democratic objective....The democratic aspect of community organizing should be reflected in the internal functioning of the group, in terms of both decision making structures and the emphasis placed on the participation of all members. Community organization is also an educational process that validates people's existing knowledge and skills and enables them to acquire new ones (p. 7).

Although not writing specifically about feminist activism, Lamoureau, Mayer and Raymond (1989) capture the essence of feminist organizational efforts designed to promote social change. From their description, it would appear that organizing for social change is

simply a matter of beginning the endeavor with the proper ideological commitments. Evidence from the women's movement however, suggests that feminist organizations are fraught with numerous problems.

Writing about feminist organizations covers a variety of topics, including the relationship between organizational structure and personal change (Hartsock 1975 & 1979; Woolsey & McBain, 1987), organizational structure and social change (Hartsock, 1974), alternative organizational structures (Nurminen, 1989; Ferree & Hess 1985), the different types of functions feminist organizations serve (Barnsley, Ellis & Jacobson 1986; Freeman & Macmillian, 1976), problems inherent to women's organizations (Freeman, 1973), feminist organizations as workplaces (McDonald, 1976), and strategies employed by feminists in their social change efforts (Bunch, 1974 & 1986; Egan, Gardner & Persad, 1988; Hartsock, 1974; Jones & Jonasdottir, 1988). In addition, related to the general theme of what happens in women's groups and how women's groups work are the topics of power and leadership. These topics are addressed by many of the authors above, as well as Bunch (1987), Downton (1973), Giele (1984), Jenkins (1980), Sacks (1984), and Stamm (1984). The first Canadian collection to address feminist organizing practices, *Women and Social Change: Feminist Activism in Canada* (Wine & Ristock, 1991) addresses virtually all of these issues in a specifically Canadian context.

Several authors differentiate between two types of organizational structures adopted by feminists in their social change groups. Freeman (1975b), for example, in writing about the contemporary women's movement in the United States differentiates between the older and younger branches of the women's movement, and argues that each adopted different organizational infrastructures. The style of organization adopted by the older branch can be characterized as traditionally formal, "with numerous elected officers, boards of directors, bylaws, and the other trappings of democratic procedure" (Freeman, 1975a, p. 449). In a Canadian context, Adamson, Briskin and McPhail (1988) make a distinction between institutional feminism (exemplified by groups such as the Canadian Federation of University Women, the YWCA and the National Council of Jewish Women), and grass-roots feminism, typified by loosely organized groups that avoid traditional hierarchical structures. Finally, Briskin (1991) makes a distinction between two poles of attraction in feminist activism - disengagement and mainstreaming - that refer to strategies feminist organizations pursue in hopes of effecting change. Disengagement "operates from a critique of the system and a standpoint outside of it, and a desire, therefore, to create alternative structures and ideologies" (Briskin, p. 31). In contrast, mainstreaming "operates from a desire to reach out to the majority of the population with popular and practical feminist solutions to particular issues" (Briskin, p. 31).

Regardless of the terms one employs in describing the two types of organizational structures common to women's organizations, one form (bureaucratic) follows traditional hierarchical organizational principles, and the other (collectivist) attempts to embody principles that grew from realizations gained through consciousness raising groups. In some cases lacking a critique of traditional organizational structures (and in other cases, perhaps finding collectivist process toocumbersome for the size of the organization),[24] typically, bureaucratic women's

[24]This may be true for the National Action Committee (NAC) in Canada. NAC is the largest women's lobbying organization in Canada, representing over five hundred women's groups ranging from women's caucuses in organized political parties and unions to small collectivist organizations that exist to address local needs in their communities. See Vickers (1991) and Greaves (1991) in Wine & Ristock (1991) for

organizations retain the structures and processes that characterize traditional bureaucratic organizations. They rely on a hierarchical structure, have set rules (and often operate with the aid of Robert's Rules of Order), pay that reflects position and so on. However, they may modify these structures to meet their needs (Adamson, Briskin & McPhail, 1988). An example of such modifications might include working with a much larger than required board of directors or executive, in order to ensure regional and ethnic representation, or, within a bureaucratic organizational structure, have all staff members perform clerical tasks related to their jobs, such as sending outgoing faxes, typing letters and so on.

Although in the early years of the contemporary women's movement in North America bureaucratic organizations tended to be organized nationally, in contrast, several groups formed spontaneously and independently of each other in major cities in Canada and the United States, beginning in 1967-1968. These groups tended to be organized around issues of local concern, and were linked by journals, newsletters and cross-country travelers. Rather than adopting formal organizational structures, these groups tended to pride themselves on their lack of organization and their rejection of hierarchy and formal leadership.

The term 'collectivist organizations' (here used to represent the same organizational forms that Bunch (1974) and Freeman (1975b) term revolutionary, and what Adamson, Briskin and McPhail, (1988) term grass-roots) does not refer to a single rigidly defined organizational form, but rather to a multiplicity of forms that share some characteristics.[25] Collectivist feminist organizations (particularly early organizations) can be seen as much as an exercise in process, as they can be viewed as an ideal organizational form.[26] Hartsock (1975) captures this concept in arguing that feminism does not prescribe an organizational form, but rather leads to questions about organizational priorities. She stresses the need to use our organizational experiences to transform the organizations themselves.

Among the characteristics of collectivist organizations are that authority resides in a collectivity as a whole, although it may be temporarily delegated. Rather than a hierarchical structure and fixed rules, collectivist organizations strive towards consensus, and fluid rules (that are situational and ad-hoc, rather than fixed and impartial). Social control is exercised through personalized appeals and shared values, rather than through supervision and formal sanctions. Within the ideal collectivist organization, there is no hierarchy of positions, and rewards (pay and benefits) are distributed in an egalitarian manner with limited differentials, rather than by office or status. There is a minimal division of labour, with administrative tasks often combined with performance tasks, and a generalization of jobs and functions. Rather than specialized roles, competency in a wide range of areas is stressed.

In a sense, and to the extent that feminist organizations operate outside of the state/institutional structure, they are free to practice collectivism as they see fit. In contrast, many feminist organizations (that, especially in Canada are often tied to government funding, and are ultimately concerned with exerting pressure on the government), must maintain a certain amount of legitimacy in the eyes of the government. If an organization is a non-profit organization, by law it is required to maintain a certain organizational structure, if only on

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extended discussions of NAC.

[25]See Ferree and Hess (1985) p. 50 for a comparison of the ideal bureaucratic and collectivist organizations.

[26]See Echols (1989) for coverage of this phenomenon in a U.S. context.

paper. In situations where this is the case, a feminist organization, by virtue of not disengaging from the government, must reconcile the competing demands of practicing a collectivist organizational strategy within the organization, as opposed to running the organization according to the criteria established by law. In the best situations, this is easily resolved: everyone consciously agrees on a structure that will make funding sources happy, that is simultaneously consistent with feminist organizational principles. In the worst possible cases, this tension between competing demands remains unresolved, and the organization collapses. At a minimum, in many instances organizations maintain two structures. One structure is used for the benefit of government funders, and staff, volunteers and group members operate according to another structure. Often under these circumstances each group member or staff member has a different understanding of the group's structure, who is supposed to perform which tasks, and how decisions are made within the group.

Perhaps because of the emphasis within feminism, particularly during the early years of the contemporary women's movement, of developing an analysis of women's oppression that held some truth for all women, there is very little written material concerned with the needs of individuals, and the actions of individuals as feminists within organizations. Echols (1989) briefly mentions personality issues that surfaced in the emergence of early U.S. radical feminist organizations, and notes the existence (also prevalent in the New Left at the time) of a belief that the needs of the movement were more important than individuals' needs. Freeman (1973) in the now classic article *Tyranny of Structurelessness* also mentions personality in her discussion of covert power structures within feminist organizations. Ironically, in discussing the demise of many feminist organizations, frequently individuals and/or personality conflicts are identified as the problem.

ISSUES ARISING IN FEMINIST ORGANIZATIONS

Briskin (1991) and Ristock (1991) both point out that feminists have faced serious difficulties in attempting to build alternative organizational structures. Ristock describes this process: "working collectively can feel like working in a structureless group where consensus is difficult to reach and where organizing efforts are stuck in a web of conflict" (p. 34). Freeman, writing about collective organizations in 1973 urged women's groups to formalize leadership, so that those in positions of authority would be made accountable. Freeman argued that where leadership remains informal, it can become manipulative and undemocratic. Ristock, writing nearly twenty years after Freeman points out that Freeman's focus on authority, leadership and power was prophetic; these remain key issues for feminist collectives in the 1990s.

A largely undocumented issue is the relations between paid staff members and volunteers in feminist organizations. Often feminist organizations, operating with minimal resources have an inadequate number of paid staff members, and rely on collective members for substantial portions of work. This leads to many difficulties, including tensions between voluntary staff members and paid staff, a blurring of responsibilities, the devaluation of work performed by voluntary staff, difficulties associated with trying to enforce work standards and deadlines among voluntary staff members, and long term organizational instability that occurs when voluntary staff leave an organization.

Often in collectivist organizations, authority and hierarchy (viewed as characteristic of patriarchal organizations) are confused with accountability and task specialization. Although there are certainly instances where collective group structures work well, in numerous

instances there is confusion about which workers are supposed to perform which tasks, and who is responsible for decision making. Frequently workers are hired without job descriptions, which further complicates the task of holding workers accountable to do the jobs they were hired to do. In addition, often volunteer staff perform tasks that are central to an organization's functioning, such as paying bills and maintaining financial records. Where it may be difficult to hold paid staff responsible for completing tasks and fulfilling organizational commitments when decision making authority is shared, often the only mechanism available for dealing with volunteers who fail to follow through on commitments to the group is social ostracism.

FEMINIST ORGANIZATIONS AND COMPUTER NETWORKS

With such great variation in the goals of feminist organizations, their infrastructures and characteristics, there are no hard and fast rules to govern the introduction of computers in general and computer networks in particular into feminist organizations. Clearly, the introduction of computer networks into feminist organizations will add an additional layer of complexity to what is in many cases already a complex and unstable organizational environment.

Contributors to the collection *Computers for Social Change and Community Organizing* (Downing, Fasano, Friedland, McCullough, Mizrahi, & Shapiro, 1991) identify several issues that have emerged in their efforts to implement computer systems in social change organizations. Fasano and Shapiro describe these organizations as "small non-profit political and community-based organizations...with small staffs, low budgets, lack of formal bureaucracies, [that are] value driven..." (p. 119). These organizations are structurally similar to women's organizations, and hence can provide valuable insights in terms of the use of computer networks by women's organizations.

Cordero (1991), in writing about a non-profit community development organization, reports that internal organizational problems related to a new computer system revolved around training and staffing. She reports that it was easier to get money for hardware, or donations of hardware than it was to get money for staff, training, or software. Observations of a St. John's Newfoundland women's organization suggest that this situation also exists in women's organizations. In the organization Cordero writes about, college interns with little commitment to the organization carried out initial programming tasks. The resultant system had many 'bugs' (technical problems). High staff turnover made it difficult to both train people to use the new computer system, and obtain information about its effectiveness.

In Cordero's workplace, the organization benefitted from having one person assigned the responsibility of maintaining the computer system. In addition, a computer specialist (employed part-time as a consultant) was involved with computer implementation on an ongoing basis. Finally, Cordero (1991) observed that even when a need for computers was recognized and computer facilities existed within an organization, users may not use computers because they lacked the time to learn (Balka, 1987 reports a similar phenomenon). To counter these difficulties, Cordero advocated computer support groups geared for non-profit organizations.

Several of the computer consultants specializing in non-profits that Fasano and Shapiro (1991) interviewed reported problems when organizations did not have a person in the organization who was willing to "champion the

process" of computerization. A woman consultant interviewed by Fasano and Shapiro stated that

> I, in fact, don't even take jobs now unless an organization has one person who is the computer champion/guru. And if an organization can't come up with that person, then I tell them they're not ready to install a database system (p. 121).

The quote above suggests that specialization of tasks may be a desirable state of affairs in terms of implementing computers in an organizational context. Along these lines, the Femail mailing list benefitted from the assignment of tasks related to group moderation to one person. And, perhaps the greatest problem with the Women's Bulletin Board System was that although different women performed different tasks related to the maintenance of that system, areas of the WBBS set aside for broadcasting information were chronically under-utilized. The task of placing information on broadcast areas of the WBBS was left unassigned.

Ironically, although collectivist feminist organizations have stressed the development of skill and sharing of work tasks, observations suggest that with regard to the use of computer systems these noble goals have often been abandoned. Often male friends of collective members voluntarily maintain an organization's computer systems for a period of time, or paid consultants are hired to fix what seems like a never ending stream of computer problems. In both collectivist and bureaucratic organizations, the skill required to maintain computer systems is rarely available in-house, and despite an awareness of both work processes and group process, computer systems have fallen outside of the scope of feminist analyses and practices.

In the few cases where information is available about the use of computer networking systems in feminist organizations, overworked staff members have consistently expressed concern about the increased tasks related to the use of computer networks. Despite rhetoric about the equal valuation of traditional women's work and work usually performed by men (e.g., management tasks), one interviewee (who maintained her organization's computer systems) indicated that in her organization computer work was equated with clerical work, and was devalued. Preliminary research conducted by a student in a communications research methods course I taught at Simon Fraser University in the fall of 1989 indicated that in one Vancouver women's organization, all work that required use of a computer was conducted by volunteers, rather than paid staff. In that organization, a paid consultant was responsible for implementing and maintaining the organization's computer systems.

Despite these potential problems, computer networks can potentially be used to both perform tasks (such as the collection and sharing of information) in which many organizations are already engaged, and expand the scope of an organization's activities. In the tradition of good feminist organizing, the adoption of computer networks by feminist organizations should be accompanied by a heightened awareness of group process and concern for working conditions. In addition, material presented here suggests that organizations should engage in an explicit process that allows groups to articulate the social goals they wish to attain in adopting computer networking technology. The adoption of computer networks by feminist organizations should address explicit social goals, rather than foster what merely is possible with off-of-the-shelf hardware and software. Extensive care should be taken to ensure that whatever computer networking system is selected will meet the communicative goals explicitly articulated by group members.

SUMMARY

To date, most of the information we have about the use of computer networks in the context of feminist social change addresses the uses of computer network in terms of personal change, or change on an individual level. The success of the Femail mailing list as a vehicle for consciousness raising is encouraging. Although there is still very little information about the use of computer networks in terms of group process, the success that members of the Femail mailing list enjoyed in terms of managing process issues that arose in that group, and the evidence from the Women's Bulletin Board System suggests that communication by computer network might well accommodate feminist group process, and the discussion of heated issues that are often ill-suited in face-to-face meetings.

Although we have little information about the processes that surround the implementation of computer networks in women's organizations, writing that addresses issues that have emerged as social change groups attempt to implement computer systems in an alternative organizational setting suggests that the adoption of computer networking systems by women's organizations (particularly collectivist women's organizations) is likely to be problematic. However, the desire to use computer networking systems within women's organizations can be seen as an opportunity to clarify issues related to roles within organizations, and issues that arise in terms of group process.

We know very little about how computer networking systems can be used by women's organizations to effect change at the level of public institutions. However, observations made by PeaceNet administrators, that groups using PeaceNet increased contact with other groups on that system and became more aware of the activities of other groups suggest that computer networks could potentially expand the capacity for coalition organizing in the women's movement. Alternatively, if each organization pursues computer networking in isolation of others, or fails to address access issues or organizational and implementation issues, we are likely to reduce (rather than increase) the potential of feminist groups to meet their goals.

CHAPTER 7

DESIGN ISSUES

INTRODUCTION

In this chapter, I begin by outlining an approach to designing and implementing computer systems, referred to as participatory design. After providing a thumbnail sketch of participatory design, I go on to discuss the mystification of computer systems and the gendered nature of expertise, as both phenomena affect women's ability to speak out about our needs as users of technology. Following what is essentially a social rationale for both why we should as women and as users engage in the design of computer networking systems our group organizations hope to use, and an explanation of why that is often difficult, I conclude the chapter (and the book) with a series of exercises intended to assist women's organizations in determining their computer networking needs.

PARTICIPATORY DESIGN OF TECHNOLOGICAL SYSTEMS: USERS AS DESIGNERS

Namioka and Schuler (1990:ii) point out that "despite a proliferation of methodologies for designing computer systems, we commonly end up with systems that are difficult for workers to master, poorly suited for their tasks, and perceived by them as job-threatening or job-degrading." They argue that participatory design represents an approach to design that differs from traditional design processes in many respects. Greenbaum (1991) suggests that the goal of the participatory design movement is to encourage active participation in the design process by people using computer systems. Neither a set of methods nor beliefs, participatory design is an approach that borrows practices from other areas and applies them to the workplace, with the end goal of enabling people to speak out about their needs (Greenbaum, 1991).

Unlike conventional approaches to design, participatory design assumes that users of technology are in the best position to determine how to improve their work and work lives, and in order to incorporate users into the design process, the traditional designer-user relationship must undergo significant change. Concern for social as well as technical aspects of new technology is central to participatory design strategies. Participatory design rejects the assumption that the goal of computerization is to automate the skills of human workers, and instead sees automation as an attempt to give workers better tools for doing their jobs. It focuses on the whole workplace and the actual practices of the people doing the work. Ideally, participatory design involves office workers at all levels in articulating their needs and expressing their concerns for what kinds of computer support they may need. It entails developing new methods to help developers and office workers actively support ongoing social processes (Greenbaum, 1991).

Participatory design, which has been successful in Europe and especially Scandinavia, has evolved from increasing attention being paid to the role of end users in the development process over the last decade. Integrating system users into the design process has followed a progression of steps (Kyng, 1988), and hasn't always brought the desired results. In light of

early failures at integrating users into the process surrounding the development of technology, researchers began to study the ways that social context, power relations and social bias may affect the actual systems that are created. To counter these difficulties, Suchman and Jordan (1988) stress the importance of demystifying technology and legitimating women's knowledge in the system development process. They argue that this will require a dramatic shift in how we view the knowledge and skills that go into system development. Such a shift must incorporate a sophisticated understanding of the social world into the system development process.

Although many feminists have been advocates of participatory design, and increasingly scholars and practitioners working within this tradition have linked feminism and participatory design (see for example Benston and Balka, 1993; Greenbaum, 1991; Suchman and Jordan, 1988; Suchman, 1994) as well as chronicled some of the issues that arise in working with women as users of technology in participatory design setting (Benston & Balka, 1993; Clement, 1991 & 1994), the challenges of facilitating participatory design within the context of non-profit feminist organizations has seldom been addressed (see Benston & Balka, 1993 for an exception). The exercises I present later in this chapter are intended to provide a focus for participatory design activities within feminist organizations.

GENDER AND THE POLITICS OF EXPERTISE

Ironically, although collectivist feminist organizations have stressed the development of skill and sharing of work tasks, observations suggest that with regard to the use of computer systems these noble goals have often been abandoned. Often male friends of collective members voluntarily maintain an organization's computer systems for a period of time, or paid consultants are hired to fix what seems like a never ending stream of computer problems. In both collectivist and bureaucratic women's organizations, the skill required to maintain computer systems is rarely available in-house, and despite an awareness of both work processes and group process, computer systems have fallen outside of the scope of feminist analyses and practices. This suggests that the dynamics of expertise may be central to any efforts to engage in participatory design in organizations serving women.

Suchman (1991) suggests that recognition that the design of technology is a continuous aspect of its use may be a first step in challenging the ideology of exclusion that separates users from designers, and the specialization of technical practice that defines expertise as the particular domain of designers. Although this is an important step in participatory design, in the context of women's organizations it is important to not only recognize that women as users of technology have knowledge that will add to the design of technology, but that the gendered relations of expertise may constrain women from contributing and/or realizing their expertise as users. In the realm of common sense women often identify what they already know as not really science, which contributes to the perception among women that both the self and personal experience lie outside of what is called science (Barr & Birke, 1994).

As Pain, Owen, Franklin and Green (1993, 13) have pointed out, "by and large the main responsibility for system design rests with those labeled as 'experts' in technical or computing knowledge....this group of experts are predominantly white, middle-class men, usually with an educational background in science." Techniques typically used to plan computer systems frame a problem in technical terms, which leaves technically trained designers within their comfort zone, and assumes that all members of the user community are equally empowered when it comes to evaluating design options. This masks gender differences in relation to technical

expertise, as well as other differences (such as work grade and organizational culture) that may effectively silence some workers (Pain, Owen, Franklin and Green, 1993). Research on gender and technology has suggested that technical expertise, which is often (thought not inevitably) in the hands of men tends to displace women's knowledge from having authoritative status (Green, Owen, and Pain, 1993; Suchman and Jordan, 1988). Clement (1991), Benston (1988) and others have noted that the separation of designers and experts has been exaggerated through the use of design techniques that stress the use of formal, abstract models, in preference to those that rely more directly on women's experience of the social world.

Language often plays a role in the gender division of expertise. Balka (1986) suggests that the language of science is an important aspect of developing one's sense of self as a scientist. Although both men and women interact with underlying systems of technology, equipment tends to be gender typed. Women are often excluded from control of large and powerful pieces of equipment. Perhaps more important, women are excluded from an understanding of technique, and the physical principles by which machines and tools operate (Benston, 1988).

As a result, women often are ill equipped to articulate concepts that are central to exercising their expertise as users of technological systems. The activity of conversing about technology is riddled with connotations of dominance, brawn and power (Lussier, 1994). Duff and Wells (1994) suggest that talking about computers has taken the place of cars and sex as popular subjects of 'guy talk' which in turn reinforces certain kinds of masculinities "through shared understandings and the creation of what could be considered an elite language" (Green, Owen & Pain, 1993, 145). Turkle (1988) and vanZoonen (1992) both suggest that the gendered metaphors of technology may hinder women from recognizing computer skills as appropriate for women. Along similar lines, Bodker and Greenbaum (1993) suggest that technology is a core domain of socially constructed masculinities, and plays an important role as a boundary marker between what is considered masculine and what is considered feminine. This in turn contributes to the maintenance and reproduction of a traditionally male power base.

Several authors suggest there are differences in men's and women's learning styles. For example, Brecher (1989) suggests there are two learning styles. Students who adhere to the rule based learning style follow rules without any real understanding of why the rules are valid. Understanding is gained through experience, which includes learning by accidentally violating the rules and discovering the consequences. Learning occurs through trial and error. In contrast, holistic learners attain an overall understanding of something prior to encountering the detailed rules that govern it. They use a generalized understanding of something to provide a framework for understanding how rules are organized. Understanding the process through which various components inter-relate precedes learning the specifics of how to interact with a given technological system (Brecher, 1989). Brecher suggests that typically men are rule based learners, and women are holistic learners. Turkle (1984) makes a similar observation about learning styles. She identifies two forms of mastery: hard masters and soft masters. Hard mastery is about control, a style more comfortable with formal hierarchical programming techniques. It is more commonly seen among men and boys. Soft mastery is more of a process of negotiation with the machine and is found more among girls and women. Any participatory design efforts that focus on populations of women as users should recognize that a multiplicity of learning styles exist, and should attempt to accommodate particularly those learning styles that Brecher and Turkle suggest are more characteristic of women learners.

Others (Balka, 1986; Honey and Bennett, 1994) have suggested that social purpose and context are important aspects of learning about science and technology for women. Honey and Bennett found that young women were interested in designing technological systems that had a social purpose, but that the obligatory curriculum required that they design devices unrelated to how they were used. Similarly, much of the adult education literature that focuses on women as learners suggests that building on prior experience is an important ingredient for adult women learners (Barr & Birke 1994; Balka, 1986). However, Barr and Birke point out that with respect to women and scientific subjects, this can be problematic as it is difficult to link the abstract knowledge of science to adults' everyday experiences. Drawing on Johnson's (1988) concept of 'really useful knowledge' (see also Balka, 1987), Barr and Birke suggest that this form of practical and theoretical knowledge is developed through use and working with others, and is more closely linked to science for specific purposes than it is the type of science typically taught in schools. Finally, Barr and Birke suggest that feminist accounts of science, which have largely been concerned with criticizing science, have neglected to address the possibility that science can be fun. Building on Moheno's (1993) work they advocate developing forms of science education that counter the modern disenchantment with science by contextualizing it. The exercises that make up the remainder of this chapter are intended for use in a group, where it is hoped that they will aid members of women's groups in both demystifying and contextualizing computer systems.

DETERMINING YOUR ORGANIZATION'S COMMUNICATION NEEDS

The purpose of this section is to provide some simple exercises that groups can use to determine what their communication needs are, and whether or not they can be met via computer network. In the event that a group determines that some of its communication needs can be met via computer network, exercises are provided here to guide the group through the process of selecting a computer networking strategy.

In this section, several exercises are presented. Each exercise is briefly introduced, and followed by an example. At the end of the section, after all o f the exercises are presented along with examples, each exercise is presented on a form with blank space where you can record answers for your group.

The first exercise asks you to clarify your group's mission and objectives, and link the activities and tasks your group engages in to your group's mission and objectives. The idea behind this exercise is that before deciding whether or not your group should use a computer network, you should think about what activities your group engages in. Then, after you have thought about the relationship between your objectives and the tasks you do to meet those objectives, you can start to figure out which (if any) of those tasks could be carried out by computer network.

In the second exercise, you are asked to think about who you are trying to serve (or communicate with) through your group's work. The idea here is to help your group think about who your group wants to communicate with, and whether or not they are on-line. After all, there is little point in investing time and energy in setting your group up with a computer network if the people you want to serve or communicate with do not have access to computers or computer networks. After you determine whether or not the people you want to communicate with have access to computers or computer networks, you will be asked to indicate the best way to communicate with your target audience if they are not on-line. Finally, you will be asked to consider alternative ways of communicating with your target audience.

In the third exercise, you will begin to work through what your group might be able to use a computer network for. You will work with the lists of tasks you developed in the first exercise. For each of the tasks your group does, you will be asked to write down who you communicate with during that task as well as how your group might use a computer network to do that task. Because it is not always practical to communicate by computer network alone, you will also be asked to indicate ways of doing the task without using a computer network.

Because many women's groups have older computer equipment or no computer equipment at all, the fourth exercise is designed to help you figure out what your computer equipment is, as well as what it can do. The text accompanying the exercise also includes some useful information about purchasing modems.

Usually when we introduce new technology (such as computer networks) into an organization, some new tasks emerge in relation to the new technology. Unfortunately, we often fail to anticipate these new tasks, we don't think about who will do them, and, as a result, our efforts to make our work easier by using new technology often fail. The fifth exercise is designed to help your group think about what new tasks might emerge in relation to using computer networks.

In some situations where computer networks have been introduced, the groups using computer networks have failed to think about who will do the new tasks related to using the computer network. Another common problem related to starting to use computer networks is that frequently groups do not develop any sort of a training strategy so workers can learn how to use the new technology. In this exercise, you will be led through a series of steps that will help your group think through who will complete what tasks on the computer network, and what type of training your group members will require.

Money is always a concern for cash-strapped women's organizations. Exercise seven is designed to help you figure out how much it will cost your group to get on-line, both in terms of dollar costs. Because as women we often take on more and more tasks without shedding old tasks, and for some of us our enthusiasm about making change often leads to unrealistic expectations about how quickly we can complete a set of tasks, the eighth exercise is designed to help your group develop a realistic timeline for setting up a new computer networking system. The idea here is that if you expect it to take a while to get set up, you are less likely to be discouraged when your group hits all of the inevitable problems that go along with computer networking technology.

The ninth and final exercise is designed to help your group figure out which computer networking services it wants access to, as well as how to pick an information provider.

These exercises have been developed in the feminist spirit of sharing power within organizations, and making decisions as a group. They also reflect the spirit of participatory design, as well as feminist critiques of technology which suggest that users, including women, have much to offer when it comes to designing and implementing new technologies. Finally, these exercises have been developed to help your group develop an understanding of computer networking technology. Hopefully, the exercises will assist your group in developing expertise about computer networking within your group, so you will not have to be totally dependent upon technical experts.

IDENTIFY TASKS YOUR GROUP COULD USE A COMPUTER NETWORK TO DO

This exercise is designed to help your group identify the tasks it does to meet its objectives, to respond to community needs, and to maintain itself as a group. Your group may be able to use computer networks to complete some or all of the tasks required to meet group objectives, respond to community needs, or maintain itself as a group. However, before considering how computer networks can be used to complete specific tasks, it is essential to identify the range of tasks your organization engages in. The first exercise is designed to help your group identify the tasks it must do, so you can then figure out which of those tasks could be done with the aid of a computer network. This exercise is in many ways the most difficult exercise included here, because it asks you to clarify your group's goals, and consider how you meet those goals. You may want to schedule several sessions to complete this exercise. For example, you may want to set aside one session or meeting for identifying your group's goals and objectives, and another session to outline the tasks your group engages in that respond to community needs, but are not directly related to your group's goals. A third session can be used to identify tasks (such as fundraising) your group must complete in order to continue to exist.

EXERCISE 1: IDENTIFY TASKS YOUR GROUP COULD USE A COMPUTER NETWORK TO DO

Steps	Results
1. On a large piece of paper, write down your organization's mission or goals. At this point, your goals should be fairly broad.	Example: to improve women's knowledge of computers in a supportive environment.
If your group's mission is unclear or its main goals can not easily be agreed upon by group members, you should plan a meeting in order to establish and agree to your organization's mission or goals.	
2. For each goal you have listed above, identify the objective or objectives your group has developed to meet your stated goals. Objectives should be fairly specific.	Example: to hold weekly, free drop in sessions for women to come and ask questions about and use computers.

3. Have group members identify all activities that are involved in meeting its stated objectives, as identified above.

   For each task you list, be sure to include additional tasks required to support your tasks.

   This is your list of tasks to meet objectives (primary tasks and supporting tasks).

Example, Primary task list:

Task:
schedule weekly sessions;

Supporting tasks:
check with other organizations that nothing for similar audience is booked during same time;
consult about space availability;
make flyers to advertise sessions;
post flyers throughout town;
mail to other organizations, membership etc.
make sure envelopes and label stock are available;
make sure mailing list is updated;
make sure 1st sessions scheduled are not so soon that members will receive the mailing after the event.

4. Identify all other tasks that staff or volunteers in your organization do as part of their day to day work, that have not been included above.

   This is your list of day to day tasks (secondary tasks).

Example, Secondary tasks:

answer calls from women seeking employment information;
refer women to other services in community;
fill requests for information on a range of topics of interest to women (e.g., where to get counseling re: sexual abuse);
provide information for students writing papers on a range of topics);
answer basic computer questions.

5. Review your primary and secondary tasks, and determine whether any secondary tasks you are currently doing should be dropped, or upgraded to primary tasks.

Example, reviewing tasks:

if your group specializes in helping women develop computer skills, and you are spending lots of time helping university students locate material for term papers, you may decide you can no longer provide that service. Or, you might decide to make that task more central to your group's goals, for example by developing a database of provincial resources about women.

6. Identify all tasks required to maintain your group from month to month and year to year.

   This is your list of tasks to maintain your organization (maintenance tasks).

Example, maintenance tasks:

hold semi-annual board meetings or steering committee meetings;
hold membership meetings;
fundraise;
recruit members at large;
recruit members for board and committees;
provide orientation for new members;
provide orientation for new board members;
facilitate ongoing communication between board and/or steering committee, staff and volunteers;
maintain ongoing communication with funders;
keep records of group's finances;
keep records of services group provides.

If serious disagreement occurs during this exercise, you should plan additional meetings to discuss group goals and objectives before continuing.

DETERMINE WHETHER OR NOT COMPUTER NETWORKING IS AN APPROPRIATE WAY TO REACH YOUR TARGET AUDIENCE

If your computer networking efforts are to be useful, you need to make sure that the people you are trying to reach also have access to computer networks, as well as the skills required to use them. This next exercise is designed to help your group think through both who you are trying to reach through the work of the your group (your target audience), and whether or not your target audience will be able to take advantage of information provided via computer network. Recognizing that the adoption of computer networking resources is uneven and happens over a period of time, this next exercise also is designed to help you think about providing alternative means of communication (for example via fax, telephone or Canada Post) as you introduce computer networking as a means of communicating.

In this exercise, you will be responding to the following questions:

- Who are we trying to reach, and are they on-line?
- If all of our target audience is not on-line, what is the best way to reach them (e.g., by fax, telephone or posting notices on telephone poles)?

EXERCISE 2: DETERMINE WHETHER OR NOT COMPUTER NETWORKING IS AN APPROPRIATE WAY TO REACH YOUR TARGET AUDIENCE

TASKS	RESULTS
1. List your group's objectives (from exercise 1, step 2). For each objective, identify the audience(s) or group(s) you are trying to reach.	Objective: to hold weekly, free drop in sessions for women to come and ask questions about and use computers. Audience: women with little or no previous experience with computers, especially those women who are currently unemployed.
You may wish to further define characteristics of your target audience(s) or group(s).	Example: women are assumed to have basic literacy skills.
You may also want to identify a secondary audience for your group's work.	Example: women with some experience with computers and computer networking.

2. Determine the geographic area your group is interested in serving (e.g., local, provincial or national).

   Example: St. John's, Newfoundland and surrounding areas.

   You may want to identify a secondary geographic area your group hopes to serve, and characteristics of the population in that area.

   Example: women elsewhere in the province of Newfoundland who may be visiting St. John's for another purpose, such as a Provincial Advisory Council board meeting.

3. Indicate whether or not you think the group you hope to serve currently has access to computer networks.

   Example:

   - Novice users in St. John's are not likely to be on-line.
   - More experienced users in St. John's may have access to a range of computer network resources.
   - In general, novice and experienced users outside of St. John's are not likely to have good access to computer networking resources because of lesser availability of the technology in rural areas, and greater relative poverty and lack of computer stores etc.
   - Teachers (both in St. John's and rural areas) are likely to have access to computer networking through Stem-Net (a provincial computer network in schools) which does not provide access to the World Wide Web.
   - Novice users may be reached through St. John's women's organizations, most of which are accessible via fax.
   - Novice users are likely to be accessible through the newsletter published by the Provincial Advisory Council, or through mailings regularly conducted by the university's Women's Studies Program.
   - Novice users may be accessible through free advertising (e.g., the community announcement section of the newspaper, community service announcements on the radio).

   If all of your target audience is not on-line, what is the best way to reach them (e.g., by fax, telephone or posting notices on telephone poles)?

4. Locate any missing information.

   Conduct an informal telephone survey, or ask for a show of hands at an event your target group is attending to determine whether or not your target group has access to computer networks.

5. Review above information and decide if computer networking is an appropriate strategy for meeting your group's objectives.

Example:

Computer networking can be used to advertise events to teachers and experienced computer network users. However, because the target group (inexperienced computer users) is not yet on-line, it is not appropriate to use computer networking to conduct outreach to that group.

6. As needed, develop an alternative communication plan based on existing communication patterns of your target group.

Example:

Contact inexperienced computer users through a variety of community announcements, posters on community bulletin boards (and at laundromats), newsletters distributed by other organizations, and faxes.

If appropriate (e.g., your group already has access to a computer network), advertise events aimed at experienced users through Stem-Net and other computer networks.

DETERMINE WHAT TASKS YOUR GROUP COULD USE A COMPUTER NETWORK FOR

This exercise has two parts. You will

a) determine which (if any) of the tasks your group must complete can be done with the aid of computer networking resources, and which type of computer networking resources are best suited to each task; and
b) determine what (if any) alternative means of communication should be provided to ensure your group's goals are best met.

List each of the tasks you identified in Exercise 1, column 2 (including all primary, secondary and maintenance tasks) in column 1 below. In order to make sure that the people your group needs to communicate with will be available if you switch to communicating with them via computer network, you should identify them in column 2 below, and indicate if they are currently using computer networks, if they are not currently using computer networks, or if some of them are using computer networks and others are not. Next, have group members discuss which (if any) of the tasks listed in column 1 could be done with the aid of a computer network. If you think a task can be done with the aid of a computer network, you should indicate which type of networking service you might be able to use, and for what portion of the task, in column 3. Because not everyone is currently using computer networks, it is important to identify alternatives to communicating by computer network. This step will help your group identify alternatives to computer networking that you may have to continue for some time after you begin using computer networks. Working from the primary task list above, you might come up with something like this:

EXERCISE 3: DETERMINE WHAT TASKS YOUR GROUP COULD USE A COMPUTER NETWORK FOR

Primary Task List	Communicate with? On-line status?	How Computer Network can be used	Alternate method of doing task
• schedule weekly sessions	• staff, volunteers; • staff may be on-line, volunteers may not be.	• use e-mail to contact volunteers re: scheduling.	• fax or voice mail may be required as an alternative
• check with other organizations that nothing for similar audience is booked during same time	• other women's organizations; • more mainstream organizations on-line. • others not on-line.	• maintain contact with other organizations about event scheduling via e-mail.	• fax or voice phone may be required as an alternative.
• consult about space availability	• other women's organizations; • more mainstream organizations on-line. • others not on-line.	• use e-mail to contact women's Center re: availability of meeting space.	• fax or voice phone may be required as an alternative.
• make flyers to advertise sessions; post flyers throughout town	• target group--most not on-line.	• computer bulletin board, electronic mailing list, world wide web page to publicize events.	• conventional methods, including faxes, posters, newsletters, newspapers and radio.
• advertise events -- mail to other organizations, membership etc.	• members and other organizations. • some on-line, others not on-line.	• Use computer bulletin board, electronic mailing list, world wide web page to publicize group's activities, solicit for members etc.	• conventional methods, including faxes, posters, newsletters, newspapers and radio.

- make sure envelopes and label stock are available, mailing list is updated,1st sessions scheduled are not so soon that members will receive the mailing after the event.
- internal organizational communication between staff and volunteers.
- Computer bulletin board, World Wide Web or computer based e-mail distribution list may be used as a substitute for Canada Post and/or phone calls for consistent computer network users.
- face to face communication augmented by phone (or written) contact with volunteers.

DETERMINE WHAT YOUR GROUP'S COMPUTER EQUIPMENT CAN DO

Now that your group has thought about what it might use a computer network for, you may want to figure out if the computer equipment your group owns will let you use computer networks to help you complete these tasks. Often even workers using a computer everyday do not know any of the computer's specifications. Frequently women's organizations use older, donated computers that may have come without a manual. Even when manuals exist, it is often difficult to extract the information you need from the manuals. In order to get set up to use computer networking services, you will need to know a few things about your computer. This next exercise will help you figure out what is inside the box, so you can determine if what you want to do with a computer network will be limited by the type of computer you have, or if you will need to upgrade or buy new equipment.

EXERCISE 4: REVIEWING YOUR ORGANIZATION'S COMPUTER INVENTORY

1. If you have the space, take all of the computers your group has and put them in one room.
2. For each computer your group has, get a cardboard magazine box. If you don't have a magazine box, you can cut up a cereal or detergent box so it looks like a magazine box.
3. Place one box next to each computer. Put a sticker on each computer that identifies it (such as 'Wendy's computer'), and label a cardboard box with a matching sticker.
4. Go through your group's office, and collect all of the material related to computers. This should include any manuals or information sheets related to computers, as well as any computer disks, sales slips from computer purchases, and computer software and manuals. Take all of this material over to where the computers and the cardboard boxes are located.
5. For each computer, determine if the computer is an Apple brand computer. If it is an Apple brand, an Apple logo or other identifying information will be visible in one or more places on the computer (Apple computers and IBM compatible computers work differently).
6. Attempt to match sales slips, manufacturer's information and disks that came with the computers (sometimes called 'distribution disks') with each computer. Some name brand computers (such

as Compaq computers or Apple computers) may have manuals that are clearly labeled and match manufacturer's labels on the computer equipment in your office.

Frequently, less expensive IBM clone computers (computers that are not made by the Apple company, and do not have an Apple logo anywhere) are sold without general operating manuals. In these cases, manufacturers may have included a series of handouts about parts contained inside the computer (such as video display cards that control your computer screen), as well as parts visible from outside of the computer (such as computer screens). You may have some manuals or handouts for parts that are inside of your computer that you cannot see without opening up the computer. These may include i/o cards (circuit boards that control hard drives, floppy drives, and sometimes printers and modems), modems, video cards and hard drives. For now, take any handouts or manuals that refer to these parts and place them together with a rubber and around them. You may need these later.

7. If you have an Apple brand computer, skip to the section below titled "If you have an Apple computer." If you do not have an Apple brand computer, follow the directions in the section below titled "If you have an IBM Computer or IBM clone computer."

IF YOU HAVE AN IBM OR IBM CLONE COMPUTER:

Browse through your manuals for each computer. You will need to identify the following for each computer:

what type of chip it has (e.g., an 8088, a 286, a 386, a 486, a pentium or 586 chip);

how much memory it has (e.g., 640 k, 1 meg, 2 megs, 4 megs);

if a modem is present, and if a modem exists, how fast it is (e.g., 1200, 2400, 9600, 14,400 or 28,800 BPS);

what type of video card is inside the computer (e.g., monochrome, CGA, EGA, VGA), and,

what computer program provides the general instructions for the operation of your computer (the operating system), and if the Windows computer program is present.

To obtain general information required for your computer inventory:

- If you have MS-DOS on your computer: Turn on your computer and type MSD and then press the enter key. MSD is the name of a computer program that will tell you some information about your computer. If this program is present on your computer, the screen will change and will show some information that will include information about your computer, its memory, the type of video card your computer has, and the 'os version', which stands for operating system. If you get a message saying something like command not found when you type msd, try changing directories to where your operating system (where DOS is located) or the windows program is located, and then type msd and hit the enter key. The directory might be called the DOS directory, the Windows directory or the system directory. If you do not know how to change directories, refer to a DOS manual or ask a friend or co-worker for help. If you are able to find the msd program on your computer, write down the information it provides above.

Because the MSD program will not tell you if a modem is installed in your computer, or the manual for the modem may be missing, you may have to check to see if a modem is present through other means. If this is the case, try the following (don't worry-- it is highly unlikely that you will harm any of your computer equipment):

a) look at the back of your computer. If there is a plug-in that looks like the place on your wall that you plug a phone in, then you have a modem installed inside your computer.

b) Check all of the things plugged into the back of your computer by following each cord from the back of your computer to where it ends. If a modem is plugged into your computer, it usually will say that it is a modem, or, will have a plug on it that looks like a phone jack used to plug a phone line into your wall.

c) If you have a laptop or notebook computer, you may have a modem that is either installed inside it, connects to it externally through a cable, or plugs into a plug directly on your computer. You can use one of the techniques above to determine if you have an internal modem or one that plugs in through a cable. However, there is another kind of modem that plugs into a laptop or notebook computer (called a pcmia modem), that looks like a credit card and is slightly larger than a credit card. If you have one of these it should be labeled as a modem, and it will have a place for you to plug a phone cord into it.

If you do not find the msd program on your computer, the pointers below may help you get some of the information you need.

- When you turn on your computer, there should be a message on the screen that says something like 'press the del key to enter setup.' Press whatever key the computer screen says to press to enter the setup. Once you see the setup screen, you will be able to obtain a great deal of the information requested above. If you are unable to determine how to enter the setup, you may be able to determine some of the information requested above by carefully watching the messages that cross the computer screen just after you turn on your computer.

- If you have a computer program such as PC Tools or Norton Utilities (or another program that is used for maintenance tasks), run that program and look under system information. By going through the system information screens, you can find most of the information requested above.

To find out what version of DOS your computer uses:

To find out what version of DOS is on your computer, right after you turn on the computer type ver and then push the enter key. If this does not work, change to the DOS or system directory and try.

To find out if your computers has Windows on it:

To find out if your computer has the Windows program on it, type win and press the enter key. This will start the Windows program, which will tell you at the beginning what version of the Windows program you are running. If this does not work, look through your computer directory (by typing dir /p and pushing the enter key) to see if a directory is called Windows. If so, switch to that directory and type win, followed by hitting the enter key.

If you find answers to these questions, record the answers below on the Computer Inventory Form (on the next page), and place it in the magazine box that has the manuals for that computer. You may not need some of the information the form asks for right now (such as what type of video card your computer has), but you are likely to need this information before you buy software, or when you set up new software (such as communications software you will need to make your modem work). Don't worry if you don't know all of the answers right now.

COMPUTER INVENTORY-- IBM and IBM Clone Computers

Computer # or name (e.g., Computer in library):_____

Computer brand name (from label on computer):_____

Type of chip (circle one): 8088 286 386 486 586 or pentium

Amount of memory (circle one):
640 k 1 meg 2 megs 4 megs 8 megs 12 megs 16 megs
other___

Modem present? (circle one): yes no

Speed of modem (circle one):
1200 2400 4800 9600 14,400 28,800
other_____

Type of video card (circle one):
Hercules or monochrome cga ega vga super vga
other_____

Operating system (circle one):
DOS 3 or less DOS 4 DOS 5 DOS 6 other_____

Windows? (Circle one): yes no

Version of Windows (circle one): less than 3.0 3.1 Windows 95

IF YOU HAVE AN APPLE COMPUTER:

Somewhere on the front of your computer, it should say what model of Apple computer you have. Write that down below.

Turn on the computer, and click on the Apple icon in the upper left corner of the screen. Select the menu item that will tell you what version of the System software you are using, and write that down below.

To find out if you have a modem inside of your computer or connected to it, look at the back of the computer. If there is a plug on the back of the computer that looks like the phone jack on a wall, then you have an internal modem.

You may have an external modem connected to your computer. An external modem may be connected to one of the plugs on the back of your computer (either the one with a phone picture on top of it, or the one with a printer picture on top of it). To determine if you have an external modem, follow the cords plugged into either the plug with a phone picture near it, or the plug with a printer picture near it. If the cord leads to a device that is not a printer or a telephone or telephone wall jack, it is probably a modem.

COMPUTER INVENTORY-- Apple Computers

Computer # or name (e.g., computer in library):_____

Model of Apple computer:_____

Version of System Software:_____

Modem present? (circle one): yes no

Speed of modem (circle one):

1200 2400 4800 9600 14,400 28,800 other_____

Next, you will need to find out if your computer has communications software that will allow your modem to work. Generally, communications software comes with a modem, so you should have it. Some of the names of communications programs that come with modems are listed below.

Mac Connector
Z-term
Kermit
Microphone
Megaphone

You may be able to find your communications software by clicking on the Apple icon in the upper right hand corner of your screen. Or, you may want to try locating the software through File Find.

For IBM and IBM clone computers and Apple Computers, to find out what speed your modem is:

If you have a modem, but don't know what speed it is, the best way to find that out is to test the modem. If you have a modem, you should have some communications software installed on your computer, so first you will have to locate your communications software. (If you have Windows, check the Accessories program group in version 3 of Windows or under programs in Windows 95 for a program called terminal, which is a communications program). Once you locate communications software on your computer, you may need to install it. You should refer to your computer manual for instructions about installing your communications software and setting it up to work. Once your communications program is working, set it for the highest speed possible (e.g., 28,000) and call a computer bulletin board in your community. (A local computer store can give you a number for a bulletin board and talk you through setting up your software to make a call). When you computer connects to the bulletin board, it will say something like "connecting at 4,800." Whatever number appears after the connecting at message will probably be the speed of your modem. Write this number down on a 3 x 5 card and put it into the magazine file for computer you are using.

Once you know what equipment you have, you will need to determine what you can do with it. The chart below summarizes some of the communication options available, based on the type of computer equipment your group has.

IF YOU HAVE ANY OF THE COMPUTERS LISTED BELOW:	YOU CAN DO THE FOLLOWING (with communication software and access to an appropriate service provider):
IBM computers and IBM clones:	
a computer with an 8088 or 80286 chip, and any modem	use electronic mail, gain access to gopher, and materials accessible through ftp as well as commercial services that do not require a SLIP account
a computer with a 386, 486, 586 or pentium chip and a 9600 baud (or slower, e.g., 1200, 2400) modem	use electronic mail, gain access to gopher, and materials accessible through ftp as well as commercial services that do not require a SLIP account
a computer with a 386, 486, 586 or pentium chip, 4 megabytes or more of RAM (memory) and a 14400 baud (or faster, e.g., 28,800) modem	the full range of telecommunication services, including the World Wide Web.
Apple computers:	
Apple II series, a Mac, Mac Plus, Mac Classic or Mac II, a Mac LC and any modem	use electronic mail, gain access to gopher, and materials accessible through ftp as well as commercial services that do not require a SLIP account
a Mac Color Classic, a Mac LCII or LCIII, a Mac IIx, IIcx, IIsi, Iivx or Iifx and a modem that is 9600 or slower (e.g., 2400)	use electronic mail, gain access to gopher, and materials accessible through ftp as well as commercial services that do not require a SLIP account
a Mac Color Classic, a Mac LCII or LCIII, a Mac IIx, IIcx, IIsi, Iivx or Iifx and a modem that is 14,400 or faster (e.g., 28,800) and System 7.0 or higher	the full range of telecommunication services, including the World Wide Web.

As always, there are some exceptions to the communication options listed above. For example, if you have an IBM computer or clone and your Internet service provider has the WWW program Lynx, you can use a computer with an 8088 or 80286 chip (or a computer with an 80386 or better chip with less than 4 megabytes of memory) to browse the World Wide Web. However, this route will not give you any graphics. In addition, it should be noted that increasingly people design parts

of the WWW so that they cannot be viewed with a non-graphic browser such as Lynx. Another exception is that one WWW browser available for the Apple Mac (called MacWeb) can be used with some of the older Mac computers, such as the Mac Plus, and System 6 software. Graphics are limited, but it does allow users to get onto the WWW with older computers.

In some cases, you may have a computer (such as an IBM clone with a 486 chip or a Mac IIcx) that is good enough to allow you to use the WWW, but no modem or a modem that is too slow. In these cases, a relatively minor investment (as little as $75.00) for a new modem will allow your group to use the WWW. In these cases, it may be very worthwhile to make this investment.

BUYING A MODEM

If you complete this exercise and learn that your group's computer does not have a modem or you want a faster modem, you may decide to purchase a modem so your group can take advantage of computer networking.

- **If you have an Apple computer,** you should contact your Apple dealer about purchasing a modem. Virtually all Apple Mac computers that were made since the Mac Plus will handle an external modem. However, the external modem you purchase must be designed to use with an Apple computer, and must come in a package with Apple Mac software. If you are purchasing an internal modem for an Apple Mac, the modem you purchase must be compatible with the Mac model you have, so you will need to consult with your Apple dealer.

- **If you need to get a modem for an IBM or IBM clone computer,** several things will influence what you can purchase. Generally, the easiest route will be to take your computer (minus the screen and keyboard) to a computer dealer, along with the box of manuals that go with that computer. Many stores that sell modems will install or set up your modem for a small fee. If you don't get your new modem set up this way (which I highly recommend), you will need to know if you have a serial port (for an external modem), or, for an internal modem, if you have any slots inside your computer (to plug the modem into), and what type of slots you have free (ISA, VLB or PCI) for your modem. In addition, in order to set up your modem you will have to know how each of the other cards inside your computers is set up, in order to avoid hardware conflicts involving something called IRQs.

DETERMINE WHAT NEW TASKS USE OF A COMPUTER NETWORK MIGHT GENERATE

Once your group has identified what you could use a computer network for (exercise 1), whether or not computer networking is a good way to reach your target audience (exercise 2), and you have determined what tasks your group can use a computer network to complete (exercise 3) and you have reviewed your group's computer inventory (exercise 4), you will need to think through how the use of a computer network in your group might change the work flow in your group, and especially what new tasks using a computer network might generate. This exercise is designed to help you figure out what new tasks will result from the use of a computer network.

Begin this exercise by copying your primary and secondary task lists (from exercise 3) to the first column of the Exercise 5 grid below.

Take the information from column 3 of exercise three (how a computer network can be used), and place it in column 2 of the Exercise 5 grid below.

Refer to the box below titled "Task Requirements Related to Uses of Computer Networks." For each task on your primary and secondary task list, determine the task requirements that may be associated with that task. Copy the task requirements (as appropriate) from the box below to column 3 of the exercise 5 grid.

TASK REQUIREMENTS RELATED TO USES OF COMPUTER NETWORKS

If you use a computer network to do the following:	**You will need a worker to do these new tasks:**
use e-mail to keep in touch with other groups	learn how to create and send messages; assign one or more staff members to sending messages and answering messages
use e-mail to advertise events	learn how to create and send messages; assign a staff member to answering questions about the event (by e-mail as well as phone, fax etc.)
use a news group or computer bulletin board to advertise events	determine which computer bulletin boards or news groups are the best places to place your information; learn how to post a message to a news group or a computer bulletin board; assign a staff member to answer questions about the event (by e-mail as well as phone, fax etc.)
use e-mail to write a document with another group, or review documents written by other groups	save files in a format that can be transmitted by computer network; learn how to upload and download files
use e-mail to distribute information to a group through a computer mailing list (e.g., meeting minutes)	create and maintain a computer mailing list; save files in a format that can be transmitted by computer network; type documents to be circulated into a computer; upload and download computer files
join a computer mailing list or list server	find out about the mailing list or list server; find out how to join (or subscribe) to the list server, as well as how to unsubscribe (or cancel) the list server; learn how to submit messages to the list server; figure out what you will do with the information you get from the list server (e.g., read it and discard it, forward it to others in your community, print it out and file it, etc.
put information about your group on a World Wide Web page	figure out what information you will put on-line; convert any information you want to put on your Web page into the required format (or hire someone to do it, which will require that you give that person paper copies or computer files containing the information you want on-line); place the converted information on-line with your service provider, and set up your account so others can see the information (or hire someone to do this); make changes to your Web page as required (e.g., add your group's new publications to the publications list on your Web page) or hire someone to do this; respond to any requests for further information that your group gets as a result of being on-line (e.g., copies of reports your group has produced, information about a program your group ran etc.).

use a computer network for research purposes	learn what resources are available and how to use them; figure out what you will do with the information you locate via computer network (e.g., save it on floppy disks, your hard drive or print it out); develop a system for keeping track of the information you find; keep a log of the places you "visited" on-line so you know how to go back to them if you need to.

EXERCISE 5: DETERMINE WHAT NEW TASKS USE OF A COMPUTER NETWORK MIGHT GENERATE

Primary Task List	How Computer Network can be used	Task Requirements
• schedule weekly sessions	• use e-mail to contact volunteers re: scheduling.	• learn how to create and send messages; • assign one or more staff members to sending messages and answering messages
• check with other organizations that nothing for similar audience is booked during same time	• maintain contact with other organizations about event scheduling via e-mail.	• learn how to create and send messages; • assign one or more staff members to sending messages and answering messages
• consult about space availability	• use e-mail to contact women's centre re: availability of meeting space.	• learn how to create and send messages; • assign one or more staff members to sending messages and answering messages
• make flyers to advertise sessions; post flyers throughout town	• computer bulletin board, electronic mailing list, world wide web page to publicize events.	• determine which computer bulletin boards or news groups are the best places to place your information; • learn how to post a message to a news group or a computer bulletin board; • assign a staff member to answer questions about the event (by e-mail as well as phone, fax etc.)

• advertise events -- mail to other organizations, membership etc.	• Use computer bulletin board, electronic mailing list, world wide web page to publicize group's activities, solicit for members etc.	• determine which computer bulletin boards or news groups are the best places to place your information; • learn how to post a message to a news group or a computer bulletin board; • assign a staff member to answer questions about the event (by e-mail as well as phone, fax etc.) • figure out what information you will put on-line; • convert any information you want to put on your Web page into the required format (or hire someone to do it, which will require that you give that person paper copies or computer files containing the information you want on-line); • place the converted information on-line with your service provider, and set up your account so others can see the information (or hire someone to do this); • make changes to your Web page as required (e.g., add your group's new publications to the publications list on your Web page); • respond to any requests for further information that your group gets as a result of being on-line (e.g., copies of reports your group has produced, information about a program your group ran etc.).
• make sure envelopes and label stock are available, mailing list is updated, 1st sessions scheduled are not so soon that members will receive the mailing after the event.	• Computer bulletin board, World Wide Web or computer based e-mail distribution list may be used as a substitute for Canada Post and/or phone calls for consistent computer network users.	• find out about the mailing list or list server; • find out how to join (or subscribe) to the list server, as well as how to unsubscribe (or cancel) the list server; • learn how to submit messages to the list server; • figure out what you will do with the information you get from the list server (e.g., read it and discard it, forward it to others in your community, print it out and file it, etc.)

DETERMINE WHO WILL DO TASKS RELATED TO COMPUTER NETWORKING, AND DEVELOP A LEARNING STRATEGY FOR WORKERS TO LEARN NEW TASKS AND SKILLS

Once you have figured out what new tasks will be created through use of a computer network in your group, you will need to figure out who will do the new tasks, how workers will learn to do them, and what tasks workers may need to give up in order to have time to meet the new work demands associated with computer networking.

In this exercise, your group will decide which workers should be responsible for which tasks. You will also be asked to have workers assess their knowledge of the new tasks, so that you can identify any gaps that exist between what a worker will need to know to complete a task, and what she currently knows. You will then develop a learning strategy to ensure that workers have an opportunity to learn skills associated with increased use of computer networks.

Computer networking will not enhance your group's ability to meet its goals unless members of the group are both able to take on the new tasks associated with computer networking, and willing to take on those new tasks.

Begin this exercise by taking the material from the last column of exercise 5, and placing it in column 1 of exercise 6, below.

Next, using the process your group normally follows to make decisions about workload (unless the way your group normally makes workload decisions doesn't work well), determine which workers (or volunteers) will assume responsibility for each of the tasks listed in column 1. Write their name(s) across from the tasks in column 2 below.

- During this exercise you may decide that you will contract out some of the tasks (e.g., maintaining your group's World Wide Web page) associated with your group's use of computer networking. If this is the case, simple write "contract" in the column indicating who will do the tasks you have decided to contract out.
- You may also want to indicate when the person you are assigning a task to is a volunteer. Many women's organizations experience difficulties when a volunteer quits, and does not provide others in the group with the information required to complete a task..[27]

  Your group may be able to avoid this type of problem by pairing volunteers with paid workers, and having the paid workers make sure that the volunteer creates a record of her work that would allow someone else to take it over.

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[27] This is a common problem with computer consultants as well-- often when a piece of work is completed computer consultants will password protect their work which may keep accidents from happening with the computer, but may also keep others from continuing a piece of work begun by the consultant or changing what the consultant has done. In situations like this, if the consultant is unavailable or the group does not want to re-hire the consultant, the group may have to begin the work done by the consultant from scratch. If you are having a consultant create a WWW page for your group, make sure you know the passwords and permissions that will allow you to update the page if the consultant disappears.

Your group may also be able to protect itself from disruption related to volunteers quitting by making sure that more than one volunteer is assigned to tasks, so if one person leaves, the other has knowledge of the task.

In the third column of the exercise 6 grid, indicate what skills the person being asked to do the new task will need to learn before she can successfully complete the task. The more accurate you are here the higher the probability that your learning strategy will meet your workers' needs.

In the fourth column of the exercise 6 grid you should indicate how the training your group requires will be delivered. To figure this out, use the information about learning needs from column 3 as a starting point for locating the training resources your group will require. You can use the information about learning needs from column 3 to ask training providers whether or not they provide the types of training your group requires, or as a list to give to volunteer trainers indicating what your group requires.

- People can learn how to do the tasks related to computer networking a number of different ways. Some people learn by doing, some by being shown, and others by reading books. You may want to start your discussion about how training will be delivered by talking about how each of your group members learns most easily, so that the training strategies you come up with will meet the needs of a wide range of people.
- It may make sense to develop one strategy for everyone in the group, or, it may make sense to develop different strategies for different people. One worker may just need a good reference book to learn how to post a message to a news group, while another worker may need first to be shown, and then may need to try it with someone beside her who can help her out if something goes wrong.

Some of the ways people learn about computers and computer networking are:

- by jumping in and trying and making mistakes;
- with the aid if a book or computer manual;
- from a friend or co-worker;
- by having someone come into your workplace for 2 hours a week and do hands-on teaching;
- by enrolling in a continuing education course offered by a university extension or continuing education department;
- by attending free sessions at a community or university library;
- by talking to people who work in computer stores or who work for computer networking service providers;
- by talking to more knowledgeable friends or co-workers;
- by watching teaching videos.

Finally, in column 5 of the exercise 6 grid you should indicate any costs associated with providing training (e.g., cost of books, consultants etc.). In the last column of the exercise 6 grip you should indicate how long you think it will take to learn the new task. After you have indicated how long you think it will take to learn the new task, double the amount of time you wrote down.

An example is provided next page.

EXERCISE 6: DETERMINE WHO WILL DO TASKS RELATED TO COMPUTER NETWORKING, AND DEVELOP A LEARNING STRATEGY FOR WORKERS TO LEARN NEW TASKS AND SKILLS

Task Requirements	Person(s) who will do the job	Learning needs	How training will be delivered	Cost of training	Time required for training
• learn how to create and send messages; • assign one or more staff members to sending messages and answering messages	everyone	Jane and Sandy know how; Robin and Shirley will be starting from scratch.	Experienced workers will train inexperienced workers.	$35.00 for reference book.	1/2 day, ongoing
• determine which computer bulletin boards or news groups are the best places to place your information; • learn how to post a message to a news group or a computer bulletin board;	Jane (researcher) everyone	Jane needs to be able to 'explore' the network. everyone	hands-on trial and error and book. Volunteer from university library or Freenet will deliver 2 2 hour courses	$35.00 for reference book. Gift certificate for $20.00 for volunteer.	8-10 hours over 2 or 3 days 2 2 hr. slots
• assign a staff member to answer questions about the event (by e-mail as well as phone, fax etc.)	event organizer	must be able to reply to mail (learned above)			
• find out about the mailing list or list server; • find out how to join (or subscribe) to the list server, as well as how to unsubscribe (or cancel) the list server; • learn how to submit messages to the list server;	Sandy (PR person)	Sandy will be starting from scratch.	A consultant will get Sandy started.	$50.00/Hr x 4 hours	2 2 hr. Slots
• figure out what you will do with the information you get from the list server (e.g., read it and discard it, forward it to others in your community, print it out and file it, etc.)	Sandy, who will be using the server, and Robin (who handles the filing).	Sandy and Robin will work together to develop strategy.	Staff meetings.	No charge.	1 hr. /Week, ongoing.

ESTIMATE HOW MUCH MONEY IT WILL COST YOUR GROUP TO USE COMPUTER NETWORKING

Before your group can make a final decision about what tasks you will do with a computer network, you will need to estimate both the financial and time demands that using a computer network will place on your organization. This exercise is designed to help you think through both the dollar costs of computer networking and the time demands that computer network will place on your group.

Below is a list that includes items your group may need to spend money on in order to take advantage of computer networking.

Go through the list, and for each item your group needs to purchase, write the price or the items (or range of prices) on the corresponding line.

- In general, you will save time and avoid getting discouraged if you pay someone to install your modem, communications software or Web browsing software. Ask whomever you hire to do this either on a flat fee basis, or to tell you the most it will cost, before they begin their work.
- Cheap is not always the best deal in the computer industry. Make sure you ask about the length of warranty (generally parts remain under warranty for a year), and NEVER buy a part such as a modem that does not come with a manual or set of instructions that tells you how to set up the part. Also, you should NEVER buy a computer or a computer part (such as a modem) without getting a copy of the software (on computer disks or a CD ROM, if your computer has a CD ROM) other than the copy installed on your computer. Occasionally less than honest computer vendors will sell you used parts or will illegally copy software onto your computer. Even if it is cheaper to go this route, you should avoid it, because the first time you need to fix something, you will be unable to fix it without a manual or a copy of the software.

You may not be able to fill in the cost of on-line services until you have completed exercises 9 and 10, below.

EXERCISE 7: ESTIMATE HOW MUCH MONEY IT WILL COST YOUR GROUP TO USE COMPUTER NETWORKING

Items to be purchased:	**Cost:**	**Explanation of costs:**
Computer		
Modem (include installation if applicable)	$75.00-$150.00	low cost for 14,400 baud modem; high cost for 28,800 baud modem
Communications software		Use what comes free with modem
Installation and/or setup of communications software	$50.00	Hire Consultant for 1 hour
Web browsing software		Free, available from service provider

Installation and/or setup of Web browsing software	$50.00	Hire Consultant for 1 hour
How-to book(s)	$35.00	To have as reference for office
Training (total training costs from exercise #6)	$290.00	Could reduce by $35.00 because we have budgeted for a book here as well.

On-line costs (you may need to fill these in after completing exercise #9)

Initial sign-up fee
Minimum monthly charge
Hourly charge

At this point, your group should seriously consider whether or not it has the financial resources to begin using computer networking at this time. You may decide after completing this exercise that your group has enough money to upgrade equipment and begin using electronic mail, but your group does not have the resources to purchase time from a commercial service provider, or create and maintain a World Wide Web page. If after you complete this exercise you find that what your group would like to do is not possible, then you should re-do exercises 6 and 7 based on what you decided after first completing this exercise.

DEVELOP A TIMELINE FOR IMPLEMENTING COMPUTER NETWORKING IN YOUR ORGANIZATION

A popular cultural myth about technology suggests that when new technology is used to complete a task, that the technology does all of the work. This view obscures the contributions people must make (for example, setting up computers, typing commands to make software work properly etc.) in order for new technology to be functional. Many organizations, fueled by misleading computer industry advertising and media hype about the information highway make a decision to begin using computer networks based on popular messages about how easy it is to 'drive up an on-ramp to the information highway.' Inspired by false expectations about ease of use, when things do wrong setting up modems and communications software (they will!) or things take longer than expected (they always do), many groups become discouraged and abandon their efforts to use computer networks. One way to avoid this type of dashed expectations about how quickly your group can get on-line is to start with a more realistic set of expectations about how long it will take for your group to get set-up to use computer networks.

The purpose of this exercise is to get your group to estimate how long it will take to do all of the things you will need to do to get on-line. You will be asked to identify events ranging from acquiring equipment to learning how to use it that are likely to take time in the process of getting on-line.

Begin by copying the list of items to be purchased that you developed in exercise 7 to the first column of the exercise 8 grid below.

Next, fill in the time requirements column, according to these general rules:

- For every purchase your group needs to make, include ½ day shopping time (or more for a new computer);

- Add a ½ day for each piece of equipment you are having installed at a store, and 1 day for each piece of equipment someone in your group is planning to install. If someone who isn't connected directly to your group (e.g., the spouse of a group member) is going to install the equipment, write down 2 days for the installation.

- If you are installing communications software from disks provided by a manufacturer, write down ½ day. If you are installing communications software from disks other than original system disks (e.g., from disks your friend copied off her computer), write down 1 day.

- If you are installing software to use the World Wide Web, write down 1 day if you obtained the software from a commercial service, and 2 days if you are trying to install either something you purchased or something you got for free (shareware). If a friend gave you a Web browser on a disk other than an original disk from a software manufacturer, assume the installation will take 3 days.

Next, you will need to account for the time it will take to learn how to use your modem and software, as well as the time it will take to learn to complete the new tasks your group will be doing.

Start by copying the task requirements you wrote down in the first column of exercise 6 to the first column of the exercise 8 grid below.

Now copy the information from the sixth column of exercise 6 above (time required for training) to the second column of the exercise 8 grid below.

Finally, keeping in mind the normal flow of work in your group, in the last column of the grid below indicate the number of weeks from when you begin the process of going on-line that the task on that line will be completed. Follow these general rules:

- If you need to get approval from your board or steering committee before purchasing equipment, be sure to leave enough time for a meeting between shopping for the equipment and having it installed.
- Do not schedule more than one session with a computer consultant or teacher in a week. This will give you a chance to practice what you learned in your first session before introducing more information.
- Be realistic about how much time you will be able to take away from your day to day activities to learn about computer networking.

Next page is an example of what this exercise looks like when it is completed.

EXERCISE 8: DEVELOP A TIMELINE FOR IMPLEMENTING COMPUTER NETWORKING IN YOUR ORGANIZATION

Items to be purchased:	Time Requirements:	Comments:	Week:
Modem (include installation if applicable)	½ day shopping ½ day installation	modem to be installed by shop; 3 weeks allows time for steering ctte to meet and approve purchase of modem.	1-3
Installation and/or setup of communications software	½ day	using software that came with the modem. Have disks.	4
Training (include itemized list from the first column (Task Requirements) of Exercise 6 above).			
• learn how to create and send messages; • assign one or more staff members to sending messages and answering messages	½ day, ongoing	3 weeks are allocated in order to give staff time to develop competence send and retrieving messages.	5-8
• determine which computer bulletin boards or news groups are the best places to place your information; • learn how to post a message to a news group or a computer bulletin board.	8-10 hours over 2 or 3 days 2 2 hr. slots	The start of this activity is 2 weeks later than above to allow the staff person responsible for this activity to dedicate her time during weeks 5-6 to helping train her co-workers.	7-9
• find out about the mailing list or list server; • find out how to join (or subscribe) to the list server, as well as how to unsubscribe (or cancel) the list server; • learn how to submit messages to the list server;	2 2 hr. Slots 1 hr. /Week, ongoing.	This is scheduled over two weeks to avoid information overload related to training sessions. It is also introduced after other events (rather than concurrently) in order to build on participant's prior knowledge.	10-11

DETERMINE WHAT COMBINATION OF SERVICES YOUR GROUP WILL NEED

By now your group should have a pretty good idea about what you can do with computer networks, what equipment you will need to do it, how much that equipment will cost, how workers will learn to use the new technology, and how long it will take to get it all to work. Finally, it is time to decide just what services your group will require. After deciding what services your group will need, it will be time to select an information provider.

The first decision your group will need to make is whether to get a shell account (where in general you type in commands (rather than click on a mouse on an icon) and you do not see graphics), or a SLIP account (that will allow you to gain access tot he WWW by using a mouse to click on icons). Each type of account has advantages and disadvantages. A few are listed below.

Shell accounts:	Slip accounts
Advantages	
• Easy to set up; • programs you will use are on your provider's machine; • low cost, or free (some bulletin board systems and community based Freenets); • you can use a low speed modem and old computers with a shell account; • commercial services may provide access to wide range of services (such as on-line newspapers).	• Users do not need to know any commands, they only have to click on icons once their system is set up; • graphics can accompany text; • your group will have access to information distributed through the World Wide Web more easily; • file transfer is easier than with shell accounts.
Disadvantages	
• You only have access to services set up by your provider; • you only see text-- no graphics; • transferring files can be tricky; • you have to be connected to your service provider while you do things like read your mail.	• Complicated set up; • typically requires a faster modem and more expensive computer to use a SLIP account; • cost of SLIP services is usually higher than cost of shell services, and SLIP accounts are seldom free.

Before your group makes a decision about what type of account it wants, you may want to get someone to show you how each type of account works.

- Your local library may provide access to computer networks that you can evaluate.

- If your community has a women's studies program, a faculty member may be able to arrange to have someone show members of your group how different computer networks work.
- Your modem may come with a promotional offer that allows you to test a commercial service provider for free (sometimes these come in the mail as well, so ask around and see if anyone has one of these promotional disks).
- You should be aware that generally people will insist that whatever system (or type of system) they are using is the best, so you will need to make sure that you evaluate computer networks based on your group's needs.

Below is a list of service options your group may want to pursue. Check off the items below your group would like.

_electronic mail

_file transfer (sending and receiving files by computer)

_access to newsgroups or bulletin boards

_access to on-line databases (e.g., newspapers, magazines, encyclopedias)

_access to Gopher

_access to Lynx (to use the WWW with a less costly computer)

_computer conferencing (not the same as newsgroups)

_access to telnet and ftp

_access to the World Wide Web

- As a general rule, if you have really old equipment and / or a slow modem, you will have to get a shell account.
- A shell account on a community Freenet may only give you access to electronic mail and limited newsgroups, while a shell account on a commercial service provider may give you access to a wide range of services such as on-line newspapers and encyclopedias.
- Generally, a SLIP account will give you access to all of the services above except Lynx, and computer conferencing which is generally only provided by large, commercial service providers.
- Not all service providers subscribe to all newsgroups, so if there is a particular newsgroup you are interested in, you should ask if your service provider gets it.
- If possible, try before you buy. Many commercial service providers will give you a few hours of free time so that you can try their computer network.

Once you have determined what services your group will require, check off the services your group would like access to on the exercise 9 grid below.

SELECT AN INFORMATION PROVIDER

Selecting a computer network provider can be tricky. Here are some things to consider when you are deciding which computer network to use as your service.

- Each provider offers a different range of services, so before you can start comparing networks (service providers), you need to find out what services each network provides.

- If members of your group want to be able to have a 'private' group discussion about a project they are working on, you will need to be able to set up a private discussion area on the computer network. Make sure the service provider you choose provides this service if you wish to use it.

- Ask other groups you work with that are using computer networks what network they are using. Many service providers niche market (e.g., attempt to attract lots of groups with similar interests), and you may find that using a network that groups like yours uses will enhance your group's efforts to carry out its work.

- Pricing schemes vary considerably between providers. Some providers charge an initial sign up fee, a monthly fee (that gives you a certain number of 'free' hours of service), and an hourly fee for each hour your group uses the network beyond the 'free' hours paid for by your monthly fee.

- Often if you pay for a year of service in advance, the monthly rate is lower than it would be if you paid by the month.

- Some service providers will let you 'carry over' unused hours from one month to the next (so if your monthly fee pays for 20 hours of free service a month, and your group only uses 15 hours, you can carry 5 hours forward to the next month).

- If you plan on having several people in your group use the computer network, the ideal situation is for each person using the account to have their own computer id. This allows each person using the computer network to have their own private electronic mailbox (otherwise, everyone in your group has to share one electronic mailbox, which can be very confusing). Typically, this costs more than having one account that everyone in your group shares. Some service providers may be willing to give you a group rate, and issue one bill for everyone in your group that is using the computer network. You also may be able to negotiate lower fees for several users in one organization.

- Many service providers will require that you pay in advance for service, provide a credit card number or authorize the service provider to withdraw money directly from your checking account.

- Community Freenets and many computer bulletin board systems offer services for free. However, the range of services they offer may be limited, and often free service providers restrict the amount of time each day that users can spend on-line. Check to see if such limits exist and try to think about whether or not time limits will make it difficult to carry out your group's work.

- Ask potential service providers what type of customer service they provide. Customer service ranges from non-existent to around the clock.

- If you are thinking about using a computer network in another location (usually such networks provide service nationally or internationally), check to see if the service provider has a local access telephone number in your community. If your group is part of a national organization or coalition, and you want to use the same service provider as other groups in your coalition, make sure that the communities where those other groups are located are served by local access numbers.

- If your group is in a remote location or sparsely populated location, be sure to ask potential service providers if you must use a value added carrier (such as Datapac) in order to connect with their network. Charges for use of a value added carrier can substantially increase the bill for your group.

- If you know (or are able to locate) other individuals or groups using the service provider you are thinking about using, speak to them about their experiences with the service provider. Ask

- if they found it easy to set up software required to use the network;

- if customer service representatives are pleasant to deal with and provide helpful information;

- if they have any trouble gaining access to the system (e.g., if the telephone number of the computer network is frequently busy);

- if they have had any billing problems.

Exercise 9, below consists of a check list of the questions above. Write the names of the service providers you are checking out across the top, and use the space provided to record answers to the questions next page.

EXERCISE 9: DETERMINE WHAT COMBINATION OF SERVICES YOUR GROUP WILL NEED

Service provider→			
Service availability:			
electronic mail			
file transfer			
access to newsgroups or bulletin boards			
access to on-line databases			
access to Gopher			
access to Lynx			
computer conferencing			
access to telnet and ftp			
access to the World Wide Web			
ability to set up a private discussion			
Does network serve similar groups?			
Costs:			
Initial fee			
Monthly fee			
# of free hours per month			
Can unused hours be carried forward?			
What is the hourly fee?			
Do you have to pay up front? If so, How?			
Are services cheaper annually? How much?			
Can you get a group rate for several users?			
Is there a local access number?			
Are there local access numbers where others in your group are located?			
Do you have to use a value-added carrier?			
If so, what is the hourly rate?			
Customer service:			
hours of operation:			
pleasant to deal with?			
helpful?			
is setting up the software required to use the service difficult?			
how often do you get a busy signal when you are trying to connect?			
If service is free, is there a daily or weekly time limit? What is it?			

BLANK GRIDS

FOR

COMPLETING EXERCISES

EXERCISE 1: IDENTIFY TASKS YOUR GROUP COULD USE A COMPUTER NETWORK TO DO

Goals	Objectives	Primary tasks:	Secondary tasks:

Primary tasks to keep:	
Secondary tasks to upgrade to primary tasks:	
Secondary tasks to drop:	
Maintenance tasks:	

EXERCISE 2: DETERMINE WHETHER OR NOT COMPUTER NETWORKING IS AN APPROPRIATE WAY TO REACH YOUR TARGET AUDIENCE

Objective:	
Target audience:	
Additional characteristics: **Secondary audience** **Additional characteristics:**	
Area you want to serve:	
Secondary area you want to serve:	
Does primary audience have access to computers?	
Does secondary audience have access to computers?	
Best way to reach primary audience:	
Best way to reach secondary audience:	
Is an alternative (to computer networking) required?	

EXERCISE 3: DETERMINE WHAT TASKS YOUR GROUP COULD USE A COMPUTER NETWORK FOR

Primary Task List	Communicate with? On-line status?	How Computer Network can be used	Alternate method of doing task

Secondary Task List	Communicate with? On-line status?	How Computer Network can be used	Alternate method of doing task

Maintenance Task List	Communicate with? On-line status?	How Computer Network can be used	Alternate method of doing task

EXERCISE 4: REVIEWING YOUR ORGANIZATION'S COMPUTER INVENTORY

COMPUTER INVENTORY-- IBM and IBM Clone Computers

Computer # or name (e.g., Computer in library):_____

Computer brand name (from label on computer):_____

Type of chip (circle one): 8088 286 386 486 586 or pentium

Amount of memory (circle one):

640 k 1 meg 2 megs 4 megs 8 megs 12 megs 16 megs
other___

Modem present? (circle one): yes no

Speed of modem (circle one):

1200 2400 4800 9600 14,400 28,800 other_____

Type of video card (circle one):

Hercules or monochrome cga ega vga super vga other_____

Operating system (circle one):

DOS 3 or less DOS 4 DOS 5 DOS 6 other_____

Windows? (Circle one): yes no

Version of Windows (circle one): less than 3.0 3.1 Windows 95

COMPUTER INVENTORY

Apple Computers

Computer / or name (e.g., computer in library):_____

Model of Apple computer:_____

Version of System Software: _____

Modem present? (Circle one):

1200 2400 4800 9600 14,400 28,800 other _____

EXERCISE 5: DETERMINE WHAT NEW TASKS USE OF A COMPUTER NETWORK MIGHT GENERATE

Primary Task List	How Computer Network can be used	Task Requirements

Secondary Task List	How Computer Network can be used	Task Requirements

Maintenance Task List	How Computer Network can be used	Task Requirements

EXERCISE 6: DETERMINE WHO WILL DO TASKS RELATED TO COMPUTER NETWORKING, AND DEVELOP A LEARNING STRATEGY FOR WORKERS TO LEARN NEW TASKS AND SKILLS

Task Requirements	Person(s) who will do the job	Learning needs	How training will be delivered	Cost of training	Time required for training

EXERCISE 7: ESTIMATE HOW MUCH MONEY IT WILL COST YOUR GROUP TO USE COMPUTER NETWORKING

Items to be purchased:	**Cost:**	**Explanation of costs:**
Computer		
Modem (include installation if applicable)		
Communications software		
Installation and/or setup of communications software		
Web browsing software		
Installation and/or setup of Web browsing software		
How-to book(s)		
Training (total training costs from exercise #6)		
On-line costs (you may need to fill these in after completing exercise #9)		
Initial sign-up fee		
Minimum monthly charge		
Hourly charge		
Hourly charge, value added carrier		

EXERCISE 8: DEVELOP A TIMELINE FOR IMPLEMENTING COMPUTER NETWORKING IN YOUR ORGANIZATION

Items to be purchased:	Time	Comments	Week
Training (include itemized list from the first column (Task Requirements) of Exercise 6 above).			

EXERCISE 9: DETERMINE WHAT COMBINATION OF SERVICES YOUR GROUP WILL NEED

Service provider→			
Service availability:			
electronic mail			
file transfer			
access to newsgroups or bulletin boards ..			
access to on-line databases			
access to Gopher			
access to Lynx			
computer conferencing			
access to telnet and ftp			
access to the World Wide Web			
ability to set up a private discussion			
Does network serve similar groups?			
Costs:			
Initial fee			
Monthly fee			
# of free hours per month			
Can unused hours be carried forward?			
What is the hourly fee?			
Do you have to pay up front? If so, How?			
Are services cheaper annually? How much?			
Can you get a group rate for several users?			
Is there a local access number?			
Are there local access numbers where others in your group are located?			
Do you have to use a value-added carrier?			
If so, what is the hourly rate?			
Customer service:			
hours of operation:			

pleasant to deal with?			
helpful?			
is setting up the software required to use the service difficult?			
how often do you get a busy signal when you are trying to connect?			
If service is free, is there a daily or weekly time limit? What is it?			

APPENDIX 1: GLOSSARY

Acceptable use policy- a policy initially developed by the National Science Foundation in the United States, to lay ground rules for acceptable use of the National Science Foundation computer network (NSFnet). Up until 1991, the NSF acceptable use policy prohibited commercial use of the Internet. The NSF acceptable use policy became a norm, governing use of networks other than the NSFnet.

Archie is a computer program and system of information servers that allows users to locate files throughout the Internet.

Browser -a computer program that allows users to move around on the World Wide Web and view hypertext (and usually graphic) documents.

Bundled electronic mail is a way of distributing electronic mail to a group of people. Typically, several people send electronic mail to a single location, and someone at that location puts all of the mail together and sends it out to others in the group. Usually this is done by a person (rather than a computer program), and message headers are removed. Bundled electronic mail is similar to a **digest** version of a **list server.**

Computer bulletin boards- public areas of computer networks where people can post messages of general interest for many people to see.

Computer conferences consist of messages or postings on a particular topic that, unlike early computer bulletin boards, are organized and linked. Computer conferences tend to read more like a conversation than computer bulletin boards or Usenet newsgroups.

Computer networks are a combination of **hardware** and **software** that are physically organized in a particular way. Computer networks can be accessed through a simple personal computer that has a **modem** attached to it, a phone jack nearby, and is using a computer communications program. They allow people to communicate over a distance.

Data-bases are computer files that are organized so that users can search large amounts of information a number of different ways.

Digest- an abridged version of a computerized electronic mailing list. Typically digests are sent out weekly or less frequently. A number of messages are placed together and sent out with message headers removed. Often the content of messages is summarized.

Document transfer- moving documents that did not originate as messages between computers (e.g., between a personal computer and a university computer) via computer network.

Domain name server- a worldwide database that keeps track of all of the names of the computers on the Internet. The worldwide domain name server works in conjunction with a domain server on your Internet provider's computer, which must translate domain names into their numeric equivalents.

Domain name- the name given to a computer on the Internet.

Electronic mail- a message that is sent and received by computer network.

FTP stands for file transfer protocol which is a set of rules that used to coordinate the movement of files between computers in a computer network.

Gopher is a menu based way to find information on the Internet. Using Gopher requires a less costly computer than using the WWW requires.

Hardware- the parts of your computer equipment you can see and touch.

Home page- a home page is a computer screen with hypertext links, and usually some sort of picture or simple graphic. A home page usually provides an overview of the information that is accessible through the home page. Individuals, businesses and organizations have home pages.

Host computers coordinate the activities of computer users who call into them. They receive mail and forward it to the appropriate place, provide a place for a database to be stored, and so on. The host computer can be a five hundred dollar personal computer, a fifty thousand dollar computer at an institution such as a university, or any computer that falls in between. Software tells the host computer what to do.

HTML stands for Hyper Text Markup Language. Files that are accessible on the World Wide Web are typically converted to HTML, which dictates the layout of the documents. HTML is a standard file type that WWW files are in.

Http stands for hyper-text transfer protocol, which is the name of the set of rules that is followed when **HTML** files are transferred between computers.

Hypertext is a way of presenting information on a computer, so users can quickly gain access to information related to what they are using. Anyone who has use an on-line help system on a computer has used hypertext. Hypertext makes it easier to explore information in non-linear ways.

Internet providers provide access to the Internet through their computers. Many commercial Internet providers exist who sell time, as well as some free, community based Internet services.

Internet stands for a computer network made up of smaller computer networks throughout the world.

Listservers are computer programs that which automate the process of sending mail out to large groups of people.

Mainframe computers are large, fairly sophisticated computers typically owned by universities and large corporations

Microcomputers are smaller in size than mainframe computers, and historically were not nearly as powerful or useful as mainframe computers. The current generation of microcomputers is more powerful than mainframe computers of the past.

Microprocessors are small chips inside of computers and computer components that are essential to the movement of information in computers.

Modem -a special piece of hardware that allows computer signals to travel over phone lines. Modem stands for modulate/demodulate.

Nodes are computers on the Internet that function as host computers.

Organizational aliases- fake names that users substitute for the name of their employers with certain types of electronic mail programs, especially those that operate under the UNIX operating system.

Packet switching breaks information sent through a computer terminal into numbered packets, and transmits them in bursts over a web-like data network. The packets are reassembled as complete messages at the receiving end. Each packet can travel many different routes, and packets can be sent several times. Packets are sent over the first open path, which could be a straight line or a large circle. The result is that messages can be sent over a computer network, even if over half the network is down.

Shell providers typically give users access to text based computer applications, such as electronic mail, newsgroups and list servers, and gopher and related programs. Users call into the shell provider's computer, and issue commands to the provider's computer from their own computer, which functions like a terminal. Shell connections are sometimes referred to as indirect connections to the Internet.

Single node wide area computer network- a computer network that serves a wide geographic area (e.g., the entire country), that requires that network users connect to the network through a single node. With the emergence of the World Wide Web, single node networks (both local and wide area) have become rare.

SLIP accounts are required to explore the WWW (unless you use Lynx, a non-graphic browser that runs on shell accounts). SLIP connections are sometimes referred to as direct connections to the Internet, because they allow users' computers to function as servers in a client-server

computing environment. SLIP stands for serial line Internet protocol-- one of the sets of rules that governs the movement of information on the Internet.

SLIP providers provide access to SLIP computer accounts, usually for a fee.

Software- also known as computer programs; a set of instructions, or recipes that tell your hardware what to do, but are intangible in the sense you cannot touch them.

Sysop is short for **system operator**. System operators maintain computer systems. They have access to all material placed on computer systems, including private electronic mail. Sysops often control use of computer networks, even when policy suggests otherwise.

Telnet allows users to initiate a connection from one host computer to another, and sign onto and use the second computer as if the first computer was invisible. One might use this capability to do something like check the card catalogue at another university's computer (if the card catalogue at that university is publicly accessible).

The World Wide Web is a hypertext and hypermedia system that allows you to browse through information on the Internet. Information can be graphic, sound, video or text.

URL stands for uniform resource locator. It tells computers where on the Internet to look for computer files or home pages. It is similar to an electronic mail address.

Value added carriers are commercial packet switching networks that you may need to use to connect to a commercial computer network located in a city other than where you live.

Veronica is a gopher search facility that searches through all the gopher menus in the world looking for words that match the search terms you enter

WAIS stands for **Wide Area Information Server**, searches for words in documents that are on the Internet, and retrieves those documents if the user requests them. WAIS began as an experimental joint venture between four companies: Dow Jones, the Thinking Machines Corporation, Apple Computer, and KMPG Peat Marwick. It was designed to retrieve full documents from various sources, either locally or through other networks.

Wide area multi-node computer networks are computer networks that serve users in a wide geographic area (such as all of Canada) that require the cooperation of lots of host computers throughout the country. Usenet is one example of a wide-area-multi-node network.

APPENDIX 2:
SOME INTERESTING INTERNET RESOURCES FOR WOMEN

Compiled by Fiona MacGregor
Master's in Women's Studies Programme,
Memorial University of Newfoundland

Electronic Mailing Lists

To SUBSCRIBE to an electronic mailing list the general procedure is to send an e-mail message to the address of the list. For example, to subscribe to the Canadian Women's Internet Association's electronic list called (Women-l), send electronic mail to . . . . . ⇨ **majordomo@women.ca**
with . . . . . ⇨ **subscribe women-1**
as the BODY of the mail message.
To UNSUBSCRIBE: send electronic mail to . . . . . ⇨ **majordomo@women.ca**
with . . . . . ⇨ **unsubscribe women-1**
as the BODY of the mail message. Usually, when you are subscribing to or unsubscribing from electronic lists, you should leave the subject line of the message back, and make sure your message contains nothing other than the line that says "subscribe...." This means that if you have an electronic mail signature, you should disable it when sending subscribe and unsubscribe messages.

Also, you should try to find out before subscribing to an electronic mailing list or list server the specific directions for that list, because many list servers use one address for handling mail about subscriptions, and another address for receiving submissions to the list.

Getting a List of Electronic Mailing Lists

A list of lists can be obtained from Listserv by sending an electronic mail message to . . . . . ⇨ **LISTSERV@Listserv.net**
In the BODY type . . . . . ⇨ **LIST women**

You will receive a list back from LISTSERV that contains a listing of lists that have to do with women, and with directions about how to subscribe to the lists. You may also want to send separate messages

that say List gender, List woman, List feminist etc. (one entry per message) to make sure you get lists you may be interested in that use these terms.

A list of gender-related electronic forums has also been compiled by Joan Koremman. It is accessible on the WWW (the URL is www-unix.umbc.edu/-korenman/wmst/ forums.html). When printed, it is about 15 pages long. It contains descriptions of lists as well as subscription information. It is regularly updated. If you are not yet on the WWW but want this list, it is worth asking a friend who has WWW access to get a copy of this list for you.

Canadian Electronic Mailing Lists dedicated to Feminism

CCWEST is a list (and a site of resources) for women and girls in science and technology in Canada.

To subscribe, send the message . . . . . ⇨ **SUB CCWEST Your Name**

to . . . . . ⇨ **LISTPROCESSOR@ CUNEWS .CARLETON. CA**

PAR-L is bilingual (English/French), moderated list for exchanging information about policy, action, and research on issues of concern to women in Canada. Begun by the Canadian Advisory Council on the Status of Women (CACSW), PAR-L is intended as a support for the community of feminist researchers and activists in Canada. To subscribe, send the message

To subscribe, send the message . . . . . ⇨ **SUBSCRIBE PAR-L Firstname Lastname**

to . . . . . ⇨ **PAR-L-SERVER@ UNB.CA.**

World Wide Web Resources

The World Wide Web is constantly changing and the following list represents only a small percentage of resources available. Addresses may also change over time but can usually be found using a search engine (a computer program found on the WWW that lets you search the Internet for words) such as Alta Vista or Yahoo. To access any of these resources, you will have to type the URLs (listed in italics below) into the appropriate part of your Web browser (e.g., in the location window of Netscape), preceded by http:// (for example, the URL for my home page 15 http://www.ucs.mun.ca/~ebalka).

Amazon City . . . . . ⇨ **www.amazoncity.com**

Billed as the first city for women on the Internet. A good place to network with other women.

A Calendar of Women of Achievement and Herstory . . . . . ⇨ **worcester.lm.com/women/history**

A Woman Motorist . . . . . ⇨ **www.womanmotorist.com**

An informative and fun automotive resource for women on the World Wide Web.

B.C. Ministry of Women's Equality . . . . . ⇨ **www.weq.gov.bc.ca**

The first provincial government to boldly allocate funding to getting more women networked and on-line.

Canadian Elected officials on the Net . . . . . ⇨ **www.reform.ca/english/other/mponnet.html**

A new way to lobby federal and provincial political party contacts.

Canadian Women's Internet Association . . . . . ⇨ **www.women.ca**

(C.W.I.A.) Home Page
A place designed to make women feel welcome on-line. Contains a special section titled "Internet Help for Women."

Canadian Women's Studies On-Line - Home Page . . . . . ⇨ **www.utoronto.ca:80/womens/cdnwomen.htm**

Includes links to all Canadian Women's Studies Programs that are currently on-line, as well as Internet resources, bulletin boards and women's organizations.

Cupcake . . . . . ⇨ **www.cupcake.com**

A humorous on-line magazine for "bad girls."

ElectraPages . . . . . ⇨ **electrapages.com**

The Women's Organization & Business Locator

Ellen Balka's Home Page . . . . . ⇨ **www.ucs.mun.ca/~ebalka**

Includes information about author's course outlines, listing of publications and current research.

Feminist Activist Resources on the Net . . . . . ⇨ **www.igc.apc.org/women/feminist.html**

A site dedicated to connecting Feminist activists on the Internet. Information can be searched by topic.

FireGirl . . . . . ⇨ **www.firegirl.com**

A humorous site dedicated to one woman's love of chili peppers.

Geekgirl . . . . . ⇨ **www.next.com.au/spyfood**

A sassy and critical look from Australia about what women are doing with the technology of the Internet.

Granny G's Canadian Neighbourhood . . . . . ⇨ **www.grannyg.bc.ca**

The Canadian Neighbourhood Homeport. Dedicated to "breaking down barriers" which exist between peoples and communities.

Leslie Regan Shade's Homepage . . . . . ⇨ **www.facl.mcgill.ca/gpc/shade.html**

Includes lots of up-to-date resources about women and computer networking.

Russian Feminism Resources Home Page . . . . . ⇨ **www.geocities.com/Athens/2533/russfem.html**

Interesting selection of references in English and Russian

Statistics Canada . . . . . ⇨ **www.statcan.ca/start.html**

An invaluable (if somewhat limited) link to facts about Canadian women.

Studio XX . . . . . ⇨ **www.odysee.net/~studioxx/xx.html**

A non-profit women's organization which aims to demystify the hype around the Internet. At time of publication page can only be seen using Netscape browser.

TAP: The Ada Project . . . . . ⇨ **ww.cs.yale.edu/HTML/YALE/CS/HyPlans/tap**

Internet resources for women in computer science.

Terrific Sites for Women on the Internet . . . . . ⇨ **www.hopper.com/womsite.html**

More resources for women. A possible connection with Admiral Grace Hopper, the creator of COBOL programming language.

The Cybergrrl Webstation . . . . . ⇨ **www.cybergrrl.com/cg. html**
One of the first Internet sites devoted to women. Hailed as "your first stop on the Web."

The Friendly Grrrls Guide to the Internet . . . . . ⇨ **www.youth.nsw.gov.aulrob.upload/friendly/index.html**
A "kewl" resource for young grrrls on-line.

The United Nations and the Status of Women . . . . . ⇨ **www.un.org/Conferences/Women/Publnfo/Status/Home.htrn**
A page dedicated to 'Setting the Global Gender Agenda."

Virtual Sisterhood . . . . . ⇨ **www.littleblue.com/vsister/dir/index.html**
A global directory of "Women's Organizations & Electronic Communications." An excellent place to advertise your organization

Webgrrls! - Women on the Web . . . . . ⇨ **www.webgrrls.com**
An international directory of women networking on and off-line.

WomensWeb . . . . . ⇨ **community.web.net/womensweb/index.html**
An excellent women's community resource centre -Canadian and global.

Women Homepage . . . . . ⇨ **www.mit.edu:8001/people/sorokin/women/index.html**
A collection of on-line writings and resources by/about/for women.

Women in Canadian History . . . . . ⇨ **www.niagara.com/~merrwill**
Canadian history by the byte! Resources about individual women in Canada's history.

Women Web Designers Canada . . . . . ⇨ **www.primenet.com~shauna/canada.html**
A list of women in Canada who design for the Internet and World Wide Web.

Women's Bookshelf . . . . . ⇨ **www.womenbooks.com**
A place where women's writing is displayed and marketed.

Women's Resources on the Internet . . . . . ⇨ **Sunsite.unc.edu/cheryb/women/wresources.html**
An easy-to-use site where information is listed by topic.

Women's Studies Resources . . . . . ⇨ **www.inform.umd.edu:**

Located at the University of Maryland, this site is an excellent resource for Women's Studies. The site also contains a picture gallery, film reviews and bibliographies.

8080/EdRes/Topic/Womens Studies

Women's Web . . . . . ⇨ **www.womenswebmagazine.com**

A diverse and aesthetic collection of women's writing.

Women's Wire Guide Page . . . . . ⇨ **www.women.com/guide**

A daily publication about women making news.

Women' space . . . . . ⇨ **www.softaid.net/cathy/vsister/w-space/womspce.html**

A Canadian magazine about how women are exploring cyberspace. Highly recommended.

Compiled July 15,1996 fm

This information is also available electronically on the World Wide Web at the following address: http://www.ucs.mun.ca/~fiona or by electronic mail. Send electronic mail requests to fiona@morgan.ucs.mun.ca.

APPENDIX3:
A SAMPLE WORLD WIDE WEB PAGE

Dr. Ellen Balka

Contact Information:

- On leave from Memorial Univeristy of Newfoundland
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- Telephone: to be updated soon.
- Email: ebalka@sfu.ca

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Provide input to questions about GENDER AND SKILL IN HUMAN COMPUTER INTERACTION
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- Technology, Gender and Risk Recreation

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Gender and Computer Networking

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